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OF

ILLUSTRATED CLINICAL LECTURES AND
ESPECIALLY PREPARED ORIGINAL ARTICLES

ON

TREATMENT, MEDICINE, SURGERY, NEUROLOGY, PÆDIATRICS, OBSTETRICS, GYNÆCOLOGY, ORTHOPÆDICS, PATHOLOGY, DERMATOLOGY, OPHTHALMOLOGY, OTOLOGY, RHINOLOGY, LARYNGOLOGY, HYGIENE, AND OTHER TOPICS OF INTEREST TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION THROUGHOUT THE WORLD

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Diagnosis and Treatment

TREATMENT OF POLIOMYELITIS

BY GEORGE E. MALSBARY, M.D.
Los Angeles, California

In the absence of satisfactory specific therapy the treatment of poliomyelitis consists largely in the prevention of the spread of the disease, ridding the body so far as possible of the virus that causes the disease, the application of such general and local measures as will tend to lessen the undesirable early pathological changes, the relief of dangerous or unpleasant symptoms, and later the relief or correction of the sequelæ, especially paralysis and deformity.

I. PREVENTION OF THE SPREAD OF THE DISEASE

With our present knowledge, the essential preventive measures are strict quarantine of all cases of poliomyelitis, the liberal use of screens, and the destruction of the breeding places of flies.

The demonstration of the presence of the virus, especially in the nasopharynx, and the possibility of the direct contagiousness of poliomyelitis and its dissemination by healthy intermediaries, speak for the necessity of strict quarantine of all cases of the disease.

Upward of fifty epidemics of poliomyelitis have been recorded. The early observers paid attention chiefly to the deformities, with occasionally some reference to the more gross anatomical changes, especially those presented late in the course of the disease. Thus, Heine, in 1840, described changes in the spinal cord and laid stress upon a sudden serous exudation in that region. But Heine was interested most in the orthopædic treatment of poliomyelitis. Charcot described the primary degeneration of the anterior horn cells in 1870. Strümpell first suggested the possibility that the disease might depend upon an external infectious agent, and first recognized the cerebral form of poliomyelitis. Notwithstanding the numerous epidemics recorded, it remained for Medin, in 1890, to present the first good clinical account of the disease.

The abortive types were first described five years later, in 1905, by Wickman, who also demonstrated conclusively the contagiousness of the disease. The disease was produced experimentally in monkeys through inoculation by Landsteiner and Popper, in 1909, and later the same year by Flexner and Lewis, and by Strauss and Huntoon, in 1910. The year 1909 witnessed the transmission of the disease from monkey to monkey by Flexner and Lewis in New York, Leiner and von Wiesner in Vienna, and Landsteiner and Levaditi in Paris, the reports of all these workers appearing within two weeks.

The occurrence of a disease in epidemic form bespeaks its infectious nature, since we do not know of any disease that occurs in epidemics that is not infectious in character. Furthermore, the epidemics of poliomyelitis, like the epidemics of other well-recognized infections, tend to follow the lines of travel. Finally, the infectiousness of poliomyelitis has been proved through inoculation experiments.

A rational attempt to prevent the spread of the disease calls for some knowledge as to the nature of the infectious agent. Peabody, Draper, and Dochez, classifying the infectious agent as a filterable virus, since it may be passed through a porcelain filter, give the following facts concerning it: "The virus of poliomyelitis is highly resistant to many destructive measures; thus, it withstands glycerination for long periods, and is not injured by 0.5 per cent. carbolic acid. Furthermore, freezing at —2° to —4° C. for forty days does not affect it materially. To heat it is less resistant, and it can be destroyed by a temperature of 45° to 50° C. for half an hour. The virus is readily destroyed by hydrogen peroxide in 2 per cent. solution, by menthol, and by corrosive sublimate. In monkeys one attack of the experimental disease prevents a second successful inoculation."

The resistant character of the virus permits it to be carried by both active and passive carriers, notably by bedding, clothing, domestic pets and insects. It is not readily destroyed by desiccation, so that possibly it may be disseminated by dust. It is not especially comforting to know that Osgood and Lucas have shown that the virus may be present in the nasal mucosa of recovered monkeys five months after the acute attack of the disease.

In a report to the Massachusetts State Board of Health on "The

possible etiological relation of certain biting insects to the spread of acute epidemic poliomyelitis," Charles T. Brues and Philip A. E. Sheppard, of Boston, suggested that Stomoxys calcitrans L. may be responsible for the spread of acute epidemic poliomyelitis. Recently Rosenau reported to the International Congress on Hygiene and Demography some experimental work showing the possibility of the transmission of poliomyelitis from monkey to monkey by means of the common stable-fly, the Stomoxys calcitrans, sometimes known as the storm-fly because it comes into the house upon the approach of a storm and is well known for its biting propensities. The work of Rosenau has been confirmed by Anderson and Frost. With this knowledge at hand, the importance of guarding against infection of and by the fly becomes apparent. This is an added reason for the general adoption of screens, to protect the well against infected flies, and to protect the sick against the bite of the fly, that thus may become a source of danger to the community. Finally, the best way to swat the fly is by the proper care of its common breeding places, accumulations of decaying organic matter, such as hay and manure, more especially cow manure. These should be kept screened from flies and promptly removed from residence districts.

The importance of quarantine in the prevention of the spread of poliomyelitis has been well demonstrated in the recent epidemic in Los Angeles, in which the establishment of strict double quarantine was followed by an abrupt termination of the epidemic.

II. RIDDING THE BODY OF THE VIRUS

Much may be done toward ridding the body of the virus. A favorite habitat of the virus is the upper respiratory tract, and it has been demonstrated that the virus may be destroyed by agents that may be used in this region without discomfort, notably hydrogen peroxide and menthol. This seems to be a favorite combination for local use in the nose and throat in these cases, the peroxide of hydrogen being used in a strength of 2 per cent., with the addition of menthol 0.5 per cent. Other substances, such as bichloride of mercury or permanganate of potassium in dilute solution, might be used, but are probably not more efficacious and are less agreeable to the patient.

Early in the disease catharsis is of value, and may assist in rid-

ding the body of some of the virus, since the virus has been demonstrated in the mesenteric lymphatics, which it probably enters through the intestinal tract. Constipation is the rule and sometimes is obstinate. Probably the best initial cathartic is calomel. Castor oil has been recommended for the same purpose. The initial laxative may be followed by a cleansing enema, with the use for several days of some saline laxative, such as Rochelle salts or citrate of magnesia, followed by orange or lemon juice, half an hour before breakfast. Later the bowels should be kept open, for which purpose cascara or senna or figs and senna may be used.

Much was hoped from the administration of hexamethylenamine (urotropin), and this drug does seem to be of value, notwithstanding the disease developed in at least one case that was taking the remedy as a prophylactic. It is well known that hexamethylenamine is excreted in the cerebrospinal fluid and may come in contact with the virus of poliomyelitis in many parts of the body. Saturation with this drug delays or prevents the experimental disease in monkeys, and its clinical use in prophylaxis and treatment seems to bear out the assumption that it is of value in this disease. It was freely used during the Los Angeles epidemic.

III. TREATMENT OF EARLY PATHOLOGICAL CHANGES

The chief early pathological changes are the toxic poisoning of the ganglion cells, and the infiltration of lymphocytes in the intercellular spaces in the meninges and between the cells in both the cord and brain. Over the former we have little or no control, and the damage it does is permanent in character. For the latter our therapy is more abundant and satisfactory; at any rate, the damage done by the infiltration is chiefly such as is caused by the pressure of the infiltrate, and is more transitory in character.

Thus far the treatment of the toxic poisoning of the ganglion cells has proved unsatisfactory. The use of hexamethylenamine for this purpose does little or no good.

The infiltration of lymphocytes tends to subside early, a fact which has led to the endorsement of numerous remedies that have been administered in various cases at the time this improvement has been noted. Notwithstanding the fact that we may not hope to secure the degree of heat or cold that has proved destructive to

the virus experimentally, the use of the full-length hot bath and the application of the ice-bag over the affected region are remedial measures of value that have well stood the test of time. The use of blisters, especially over the affected cervical or lumbar enlargement, or as linear strips of blister plaster the full length of the spine, has the endorsement of long usage and in some cases undoubtedly seems to be productive of good results. Much in the same category appear the local abstraction of blood, the use of leeches, cups, etc., along the spine, especially in the region of the affected cervical or lumbar enlargement. For this purpose the use of the cups is preferred. It is possible that cathartics may have some influence upon the infiltration. At any rate, an initial dose of calomel seems to be of value. The inunction of mercurial ointment to the back, at one time highly vaunted, seems to do good in some cases, the beneficial action possibly being due to the massage alone. Ergotin, belladonna, and iodide of potassium have their advocates. Painting the region of the spine with iodine, best in the form of Churchill's tincture, is often followed by good results, which have been attributed to reflex stimulation.

IV. TREATMENT OF SYMPTOMS

Fever above 103° F. calls for hydrotherapy, usually best in the form of the full-length hot bath. Probably no single item of treatment gives greater comfort than the careful use of the hot bath. The bath should be full length, with an abundance of water at 100° F., lasting ten to fifteen minutes, and repeated every four hours. The temperature of the water may be increased up to 102°—104° F. by the addition of hot water. When removed from the bath, the patient should be rolled in blankets, without exposure while drying. It is a good general rule to disturb the patient as little as possible. The use of the ice-cap and of ice-bags along the spine is justified through deference to custom, so long as they do not add to the discomfort of the patient. We should not forget that the comfort of the patient is a very important item in maintaining that resistance commonly known as the normal immunity of the body. The application of cold to the spine and head is often pleasant to the patient and tends to reduce the temperature. Likewise, the application of an ice-bag to the precordial region in cases with a high temperature and

a weak rapid pulse tends to reduce the temperature and slow and strengthen the action of the heart, and assists the elimination of poisonous products through the kidneys. It should go without the saying that the patient must be kept abed and quiet during the entire acute stage of the disease, and the diet must be light while there is fever. For the child from three to five years of age the diet may include milk, broths, soft boiled or poached egg, toast, and fruit juices.

Fever below 103° F. does not demand special treatment, further than rest abed, light diet, and tepid sponging, with the cold applications as above referred to.

The pain and nervous symptoms may be allayed by hydrotherapy, and the use of the salicylates, acetanilid, phenacetin, or lactophenin, if the heart is weak. One of our older patients, a young lady of education and refinement, whose statement could be trusted, described the retraction of the head as a voluntary effort to relieve pain, since she was free from pain only when the head was in that position. The patients should be kept quiet abed, and permitted to assume the position in bed that is most comfortable to them. Sometimes it is necessary to relieve the patient of the weight of the bedclothes, which may be sufficient to cause discomfort. Unnecessary handling should be avoided.

Coma is an exceedingly dangerous symptom, though not necessarily fatal. Attention should be given the support of the heart and the reduction of any excessively high fever, above 103° F. No attempt should be made to arouse the patient. In the way of analeptics, the most useful are the sodium-benzoate of caffein internally, camphor in oil hypodermatically, and adrenalin, also given subcutaneously. The intravenous use of saline solution is justifiable, but is of little value.

Constipation is more common than diarrhœa, and should receive proper attention. Following the initial catharsis, usually secured by the administration of calomel, the bowels should be kept open. For this purpose one of the fig and senna mixtures or syrups, or a preparation of cascara in liquid form, will be satisfactory.

Sometimes there is retention of urine. This may be relieved by warm compresses or, better, the hot bath, or catheterization may be required.

V. PREVENTION AND TREATMENT OF PARALYSIS AND DEFORMITY

After about two weeks, with the subsidence of pain and tenderness, more active measures are directed toward the prevention and treatment of the sequelæ, especially the paralyses and deformities. For this purpose the most important agents at our command are electricity, massage, and gymnastics, with occasional appeal to orthopædic apparatus or operation.

Erb long ago added his endorsement to the use of galvanism of the diseased area within the cord, a large electrode being placed upon the portion of the back corresponding to the diseased lumbar or cervical enlargement, the other electrode applied to the anterior surface of the trunk. The anode and then the cathode are used for from one to two minutes at a time with a moderately strong current. The interrupted galvanic current may be advantageously used in this way, with short séances and a mild current.

More common is the use of peripheral electrical treatment. For this purpose both the galvanic and the faradic currents are used, depending upon the degree of degeneration. If there is response only to galvanism, that current should be employed. When there is response to faradism, a combination of the primary and secondary faradic currents may be used.

Massage should be begun as soon as the patient is sufficiently free from pain to tolerate handling without discomfort. At first light massage is used, in séances that stop short of fatigue of the patient, repeated twice a day. Heat and baking are useful adjuncts.

At first passive and later active movement is of very great value,—so-called muscle training. The use of active gymnastics is sometimes difficult with very young children, who are prone to avoid the use of a weak or injured muscle. Sometimes the desired end may be accomplished in such cases by inducing the child to engage in some game or play that will involve the use of the affected part. Playing games, as with floating toys, in a hot tub bath sometimes solves what otherwise might be a very difficult problem. Exercise may be carried to the point of tiring the muscle, but we should avoid fatigue and strain. Usually short séances twice a day will be sufficient.

Calisthenics are important and should be made as pleasant to

the patient as possible. They may be begun in the hot bath, when movement will be possible often a number of days before it could be elicited out of the bath. After the patient is able to be up and dressed, in the second stage, the use of the warm bath once a day is still of value. With all children, and especially with young children, it is important to have them engage in gymnastics as a matter of fun and recreation rather than of duty, which soon tends to become decidedly irksome.

The use of electricity, massage, and gymnastics should be continued until the affected parts have returned to the normal, or for at least a year in those cases in which the paralysis seems to be permanent in greater or less degree. Under this treatment, any paralysis remaining at the end of a year may be regarded as permanent.

The avoidance and treatment of the deformities, especially the contractures following paralysis, often test the ingenuity of the practitioner. It is essential to guard the movements and gait of the patient so as to avoid the undue burdening of one side of the body and continuous false positions. The tendency to talipes equinus may be overcome by fastening the foot to a light footboard in such a manner that the foot may be kept slightly flexed by a light rubber band extending from the toe of the footboard to the leg just below the knee. Sometimes the use of stout laced boots is sufficient, possibly with the additional support afforded by a steel shank or with the sole slightly thicker on one or the other side. Thus may the tendency to the development of talipes varus or valgus be counteracted. For the tendency to the development of talipes calcaneus the posterior muscles of the leg may be more or less substituted by a rubber band from the heel to the leg just below the knee.

Residual deformities, that do not yield to massage and gymnastics, have called into existence a multitude of orthopædic appliances. Sometimes much may be accomplished by tenotomy and forcible correction. Some good results have been reported from the transplantation of muscle.

Tendon transplantation, inserting the distal end of a healthy muscle into the periosteal insertion of a paralyzed one, is a useful procedure in suitable cases. Thus paralyzed tibials may be replaced by peroneals, or *vice versa,* the hamstrings may supplant the action of the quadriceps, or the trapezius may take the place of the action of

the deltoid, the transplanted tendon being lengthened with silk if necessary.

Flail joints may be made stable by arthrodesis, removing sufficient cartilage to secure ankylosis. This is applicable to the hip, ankle, elbow, and shoulder in children over twelve, and to the knee in adults. Silk ligaments have a field of usefulness, as the use of an anterior silk ligament carried beneath the annular ligament in cases of persistent foot drop. Satisfactory nerve transplantation remains a problem for the future.

SUMMARY

During the acute stage the child should be kept quiet and comfortable, abed in a separate room. Isolation would be justified upon therapeutic grounds alone. Hilton, in his *Rest and Pain,* long ago emphasized the importance of rest in therapy, and the necessity of relieving pain. Those observations, couched in irreproachable English, may well be applied in the treatment of poliomyelitis. Rest implies both quiet and freedom from pain. The patient should be kept comfortable. The patient tends to assume the posture in bed that is most comfortable. This should not be interfered with. Frequently the body is more or less in the position of opisthotonus, assumed instinctively, since thus the pain is minimized. The use of the plaster cast in appropriate cases has been suggested, but the writer has not seen a case in which this seemed to be needed.

For the relief of pain, to control nervousness and contribute to the comfort of the patient, hydrotherapy and the various sedatives already mentioned are useful. Codeine or morphine is very rarely necessary

The sick-room should be light, airy, and well screened. A screened porch is very satisfactory. The surroundings should be as pleasant as possible, since after the first few days the patient is comfortable and usually acutely able to appreciate the environment.

The initial catharsis, and later the rational use of laxatives, are important. The routine use of hexamethylenamine is in vogue. Care should be taken to avoid irritation of the kidneys with this drug.

The upper respiratory tract, especially the nasopharynx, should be kept clean. For this purpose the mild mentholated peroxide of hydrogen, already mentioned, is useful.

Massage, the use of electricity and nerve tonics should be avoided during the acute stage.

With the subsidence of the acute symptoms, the disappearance of fever and tenderness, the treatment is directed especially toward the paralyses and deformities. During this period, sometimes called the second stage of the disease, chief reliance is placed upon the use of electricity, massage, and passive and active gymnastics,—so-called muscle training. To these we might add the use of rational suggestion in securing the co-operation of the patient, which is often of value, especially when dealing with very young patients, such as form a large proportion of those affected. In no case should the treatment be discontinued so long as there is any improvement, though usually whatever paralysis remains at the end of a year will be permanent.

The so-called nerve tonics are of value. Any anæmia should be corrected. Fresh air, sunshine, possibly a sojourn at one of the mineral springs, will contribute to the recovery of the patient. Thermal springs, saline springs, thermal saline springs rich in gas, cold-water cures, sea-baths, are suitable to various classes of patients. For children, saline springs and saline thermal springs, with later light cold-water treatment, may be suggested. Older children may receive sea-baths with the bracing effect of the sea-air. For adults, the gaseous saline thermal springs may be recommended, with later the cold-water cure.

A word as to diet. During the acute stage the patient should receive the usual fever diet, or possibly no food for 24 hours or so, should the fever be excessive and the cerebral symptoms marked. With the subsidence of the acute onset the appetite may be above the normal. It is a pretty good general rule, in these cases, to give only easily-digested food so long as there is fever, not neglecting, however, to maintain the number of calories needed by the patient. Much depends upon the age of the patient. With the subsidence of the acute symptoms the diet should be nourishing and abundant, adapted to the digestive ability of the patient.

Finally, we must emphasize the importance of patience and persistence in treatment. Probably no physician is justified in considering any case as hopelessly paralyzed. Surely, with our present knowledge, it is akin to a crime to rob a patient of hope.

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A SIGN OF DIAGNOSTIC VALUE IN OBSCURE CASES OF CHRONIC APPENDICITIS ELICITED BY RECTAL PALPATION *

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It seems rather presumptuous, in consideration of the large number of publications on this subject, and before so distinguished a body of men, whose labors have thrown so much light upon it, to offer at this late date a "point" that may prove of value in establishing clinically an absolute diagnosis of the more obscure forms of chronic appendicitis. The group of cases comprising this class constitutes a chapter in itself.

Chronic lesions of the appendix may be conveniently considered under two heads: Conditions where the chronic inflammatory process has involved the appendix with the formation of adhesions, and conditions where the chronic inflammatory process has been simply confined to the appendix with an absence of adhesions.

To the pathologist such a division is of very little interest. The clinician, however, who observes and studies his patient as a whole, may find some value in this simple classification.

A chronic appendiceal lesion complicated with adhesions is prone to give a more exaggerated clinical picture than the chronically inflamed appendix without adhesions. With as vague a symptom-complex as most of these patients present, a clinician will hail with gratitude any sign or symptom that may prove an aid in arriving at a more definite interpretation of the cause for the existing condition. A chronically diseased appendix is a positive menace to the health of the patient. Through the sympathetic nervous system its scroll of vexation is so far reaching that it may agitate every organ in the abdominal cavity and cause it to masquerade under a mantle of symptoms so adroitly that any organ, though free from pathology, may become the recipient of an unjust

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accusation. Pain in all morbid conditions is our greatest diagnostic asset. Through its scientific interpretation we expect to be guided into an avenue that will enable us to clinically establish a diagnosis as speedily and accurately as our ability will permit.

The class of patients upon which the interest of this paper is centered is the one suffering from chronic appendicitis presenting an obscure clinical picture. The class is a large one and usually embraces those in adult life.

These patients come to us, not immediately after they have become indisposed, but long thereafter,—I may say weeks and months after much drugging at home and visits to many doctors, without any appreciable improvement. There is much of a sameness in their histories: not sick enough to be in bed, not well enough to be at work. Upon rising in the morning they feel fairly good and strong. After two to four hours at work their strength and endurance begin to flag, they become fatigued and feel unfit to meet the requirements expected of them. Sleep is usually good, but it does not prove as refreshing as it formerly did. The appetite is variable,—*i.e.,* they could eat heartily, but are afraid to, because it leaves them with a feeling of fulness, logginess, and frequently nausea. Usually a gassy feeling with distress, amounting in some instances to pain, follows. This pain is of a queer, heavy, and prolonged nature, and is generally referred to the stomach or indefinitely through the bowels. Taking food moderately or not at all, according to the inclination, becomes a habit. By strenuously observing a rigid diet régime these patients can make themselves quite comfortable. In most cases the bowels are very obstinate, and frequent recourse must be had to laxatives. The general feeling of such patients is one of apathy.

In what condition do we find these patients when they come to us? Some of them are in such a miserable state that it is difficult to know where to begin with the clinical examination. They have recited their story so often to the different doctors they have visited and in turn have received such varied information that it is almost impossible to get a clear or concise history. Many of them have drifted into a neuropathic state with an associated psychologic condition that demands the most exhaustive examination to disclose the real cause. This is principally true of women. Others give marked

evidence of a slow toxæmia caused by the absorption of ptomaines generated by bacteria in the intestinal tract, while some show an alarmingly low resisting power, frequently associated with a concomitant anæmia. Ask these patients if they suffer pain, if so where? The majority will answer by placing the hand upon the region of the stomach and with a sweep pass it over the entire abdomen. When asked what treatment has given them the greatest relief, the usual answer will be, "Washing out of the stomach and enemas."

Many of these patients come to us discouraged and with a heavy heart because they have been given to understand, after all treatment has been of no avail, with a recovery as remote as ever, that they are either neurotics, neurasthenics, or hypochondriacs. What does the clinical examination of such a patient reveal? From the vagueness of the history it can be inferred with an appreciable definiteness that the primary irritant must be somewhere in the gastro-intestinal tract.

It must be borne in mind that in a chronic condition, such as we have in these patients, a primary pathology having its seat in one organ may bring out secondary conditions elsewhere. This secondary pathology may become independently established and cause a fusion of the symptoms without much change in the already existing clinical picture. Such a conglomeration precipitates additional difficulties in diagnosing the actual pathology. Even indefinite as the symptomatology that is presented by these patients appears, it should permit the elimination without difficulty of gastric neurosis, gall-bladder disease, ureteral calculus, and, in women, disease of the adnexa.

On the other hand, this blurred clinical picture will draw into the diagnostic field for consideration: atonic dilatation of the stomach, visceral ptosis, prolapse of the kidney, certain chronic forms of duodenal ulcer, and chronic appendicitis. A thorough examination should readily eliminate from this picture atonic dilatation of the stomach, visceral ptosis, and prolapse of the kidney, leaving for contention certain chronic forms of duodenal ulcer and chronic appendicitis.

Can the surgeon, after an exhaustive examination of a patient presenting a clinical picture indicative of a chronic duodenal lesion,

or a chronic appendix lesion, or both, but strongly wanting in the characteristic diagnostic points, say with certainty that his patient has the one, or the other, or both? In some cases, perhaps, yes. In the greater number of cases, however, no.

When our "points" with which we are so familiar, and upon which we rely so much in arriving at a diagnosis, serve us negatively, and the number of cases harboring this disappointment is not small, we are at a loss to locate the actual pathology.

In the more obscure forms of chronic appendicitis, where other "points" have failed, it has been my good fortune to make an absolute diagnosis through a "point" located in the first portion (sigmoidal portion) of the rectum. These cases belong to a class whose symptomatology does not invite attention to the appendix region on account of the total absence of focal symptoms. It is a fact that in many of these cases pressure at McBurney's point has not given us the reflex of pain that we expect and usually get in an appendix lesion of this character, while pressure at Morris's point has proven equally as negative. An absence of these reflexes is usually sufficient to dismiss the thought of an existing appendix lesion.

The "point" in the rectum, however, has invariably given a positive reaction in the presence of a chronically diseased appendix. The part of the rectum concerned in this examination is the first portion. It commences at the sacro-iliac synchondrosis, usually the left side, is entirely covered with peritoneum and has a mesorectum, which gives that portion of the bowel a certain amount of mobility. This mobility is of some value in the examination. Within the lumen of the bowel, at the junction with the sigmoid, about 3½ or 4 inches above the margin of the anus, there exist aggregations of circular fibres that form a valve. This valve is constant, is known as the valve of O'Beirne, and varies but little in its distinctive circular characteristics. It serves as a landmark, and is an important factor in the examination.

In making the examination to reach the "point" the patient is comfortably placed on the examining table upon his back, with both legs flexed. The index-finger, well lubricated, is introduced into the rectum, and a search made for O'Beirne's valve. This is sometimes reached with some difficulty, especially when it is located high, or when the examining finger is rather short. It is absolutely neces-

sary that the valve be located. It is readily perceived, the sensation imparted being very similar to that which the examining finger experiences when introduced into the os uteri during the first stage of labor. In size I have found the valve to vary, in some as large as a 10-cent piece, and in others as large as a quarter. The valve having been located, the finger is hooked into it and gentle traction made upon the structures to test the mobility of that portion of the rectum. The tip of the finger is allowed to rest within the lumen of the valve and the patient asked if he experiences any pain. The answer is usually no. Should there be any pain, it is generally referred to the sphincter area of the rectum. By allowing the finger to rest for a short time this pain will subside. It is desirable that the patient be entirely free from pain while the examining finger is in this position. After being assured of the total absence of pain by the patient, the tip of the finger is gently pushed upward toward the right iliac fossa, when, in the event of an appendix lesion, the finger will touch a point beyond the valve that will cause great pain. As a control manœuvre a similar "point" may be touched by sweeping the examining finger toward the left inguinal fossa, usually with negative results.

The accuracy of the diagnostic worth of this point has been verified in some two hundred cases. The patients comprising this series gave a period of time when their health was not good, ranging from six months to twelve years. After ablation of the chronically diseased appendix, the patient was fully restored to health in from three months to two years.

CLINICAL SYMPTOMS AND DIAGNOSIS OF GALL-STONES *

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Nicety in diagnosis belongs to medicine as an art. Any old diagnosis will do for medicine as a trade. The orderly at the University Hospital of the University of Michigan used to say: "The treatment—I could treat them, but—it's the diagnosis."

In every phase of medical practice to-day the emphasis is being placed on *early* diagnosis. Geraghty and Rowntree have a device for the early diagnosis of renal insufficiency; tuberculosis is being cured because of its early recognition; and the X-ray plate is valuable because of the immediate diagnosis it gives of fracture and of many other surgical and medical conditions. It is not wise to wait until the complications of gall-stone disease arise—angiocholitis, cholecystitis, hepatitis, endocarditis, cancer of the gall-bladder, perforation of the gall-bladder or bile-ducts, biliary fistula, or peritonitis —before a diagnosis is made. Diagnosis takes time, but there are people who are willing to pay for the physician's time. Others may be studied by the younger physicians for their own enlightenment.

Graham and Guthrie have distinguished four stages in the development and symptomatology of gall-stone disease.

(1) "Those patients with mild disturbance, usually gastric and often lightly considered by the patient and physician. These are light attacks of distress, gas, upward pressure, coming frequently soon after food, or at irregular times, often of sudden onset and short duration, and are eased by belching, slight vomiting or regurgitation, or slip away almost unnoticed and without treatment, though various measures may get credit for their relief. These sudden, irregular, mild dyspeptic attacks are quite as typical of gall-bladder disturbance as are the servere, typical attacks which, as a rule, supplant the mild.

(2) "There is another class of patients with more or less pro-

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longed, dull (mild or severe) pain in the epigastric area, right hypochondrium, or whole liver area. This pain may be increased by food, exertion, or motion: deep respiration gives pain, and when located posteriorly the trouble may wrongly be called pleurisy. These patients pass through prolonged, steady attacks, their distress may alternate with ease, and comparatively good or excellent health may be enjoyed for a time. During an attack dyspeptic symptoms are prone to be present, and but for the irregularity, as compared with ulcer, one might oftenest consider gastric lesions."

Lichty, of Pittsburgh, from a study of his own and his brother's cases estimates that about 75 per cent. of all gall-bladder cases are associated with a disturbance of gastric secretion, and of this 75 per cent. two-thirds have hyperchlorhydria. Gastric motility, as well as gastric secretion, is disturbed in about the same proportion of cases. He confirms Rolleston's statement that "indigestion is a frequent result of gall-stones, and so-called irregular biliary colic not infrequently manifests itself as dyspepsia." In the height of the attack of biliary pain the gastric secretions may be subnormal or HCl may be absent, while during the interval there exists a hyperchlorhydria.

These findings have a physiological explanation, as witness the experiments of Pawlow, Starling, Cannon, and Murphy. Cannon, particularly, has shown that the dominant control of the pylorus lies on the duodenal side of the pylorus, and any disturbance there, such as of the biliary, pancreatic, or duodenal function, may disturb the normally well-balanced mechanism of the pylorus. Pylorospasm is usually accompanied by disturbance of both the secretory and motor functions of the stomach.

In the light of the experimental work and clinical observations of these several investigators, hyperchlorhydria is a finding to be looked upon as significant of a definite pathological condition, which may be determined positively by reviewing the rest of the symptom-complex.

(3) "In the third class a gall-bladder disease is to be found the great number in whom the correct diagnosis is made, and in this class surgery finds its greatest activity. Here we have the so-called typical gall-stone attack—sudden, severe, epigastric pain, radiating to the right costal arch (at times to the left) through to the back

or scapular region, spasm of the diaphragm, upward pressure, gas, nausea, vomiting, and after a longer or shorter terrific attack comes sudden cessation, and, till complications occur, almost immediate return to health. Sudden onset and sudden cessation without apparent cause or without treatment are quite peculiar to gall-stone disease when complications are present. These attacks come irregularly, night or day, and oftenest bear no relation to food, though often called acute indigestion, gastralgia, neuralgic stomach, and other equally incorrect names."

(4) "The fourth condition is that of chronic gall-bladder trouble —adhesions, duct obstruction, perforation, contractions, and duct infections—with pancreatitis. Often in this class chronic gastric disturbances predominate, and the picture is so closely related to chronic ulcer with complications that a differential diagnosis cannot be clearly made if only present symptoms are considered. A correct diagnosis depends on the careful review of the early history."

As a confirmation of our new conception of gall-stone disease, the pathologic studies of MacCarty are important. He concludes, from a careful review of 365 cases, that the gall-bladder, liver, duodenum, pancreas, and stomach are embryologically, anatomically, physiologically, and pathologically closely related and should be considered a gastro-duodeno-hepatico-pancreatico-physiologic system.

It will be noted that so far I have not mentioned the typical text-book symptoms of gall-bladder involvement. We know that women are more often affected than men; that 40 is an average age for its incidence, and that the victim is frequently obese. Quiescent gall-stones often become active during pregnancy or following parturition. Wm. J. Mayo says that 90 per cent. of women who have gall-stones have borne children, and 90 per cent. of these women identify the beginning of the symptoms with some particular pregnancy.

Cabot places gall-stones as a cause of jaundice third in the list, precedence being given to icterus neonatorum and sepsis. By the time "Nature hangs out the yellow flag of jaundice" (Mayo) the case is too evident to give any zest to its recognition. If jaundice is prolonged there is loss of weight, as much as 40 pounds. Courvoisier's law holds good, that long-standing jaundice in 84 per cent. of cases of stone in the common duct is usually associated with a

contracted or functionless gall-bladder. Cabot gives prominence to chills as a symptom. Rigors may occur at about the same hour daily and last for fifteen or twenty minutes.

Under the name "satellite symptoms," Dieulafoy mentions vertigo, syncope, and gall-stone fever. He distinctly differentiates between aseptic gall-stone fever, claiming it can appear as a relatively early symptom, and fever arising from a secondarily infected calculous gall-bladder. Leucocytosis is a confirmatory sign of an infective condition.

Gall-stones may be found in the stools from two to seven days after an attack of colic. The cystic and common ducts are capable of such distention that they may allow the passage of a calculus as big as a hazel-nut. The common duct, when distended, may be as large as a coil of bowel. (Dieulafoy.)

If obliteration of the common duct lasts long enough, the patient shows whitish stools, due to the absence of bile and the presence of non-emulsified fats. The stools have a prohibitive odor. The urine is loaded with bile pigment and shows a characteristic mahogany color. Radiography, when the plate is most advantageously placed, will show the stones *in situ*.

The previous history of typhoid fever is important. Hertz and Adams report an instance of the formation of cholesterol gall-stones containing typhoid bacilli within sixty-eight days of the onset of typhoid fever. The stones and the clear fluid and pus all contained a pure culture of typhoid bacilli.

It still remains for us to differentiate between gall-stone and other disease, such as peptic ulcer (gastric or duodenal) and chronic appendicitis. The average age of 40, absence of childhood attacks, no relation to ingestion of food, mildness of digestive disturbance, sudden appearance of pain and sudden relief, the radiation to the back, the right axilla, and to the right shoulder are distinguishing features.

Acute pancreatitis accompanies or follows gall-bladder disease, and is more severe in its manifestation.

Lead-poisoning shows a lead-line on the gums, the history of having worked with lead, and is further differentiated by a study of the blood. Tabes shows absent knee-jerks, Romberg's sign, and the Argyll-Robertson pupil and history of syphilis.

To differentiate from constipation, pericarditis, and angina pectoris along with other physical signs characteristic of these conditions, Cabot proposes to mention three stages of pain and tenderness applicable to a case under study:

(1) The initial pain, its location being of great diagnostic value if the history is clear and definite. (2) The subsequent radiations of this pain, often most confusing. (3) Its final "settling" in a single spot, most important in diagnosis, but often dangerous to wait for.

In conclusion:

(1) Gall-stones may be diagnosed early.

(2) The stomach symptoms and stomach analysis are of compelling importance in the early stages of gall-stone disease, especially pylorospasm with hyperchlorhydria and inhibited motility.

(3) There may be disease of the gall-bladder without jaundice, and jaundice may indicate other conditions than gall-bladder disease.

(4) A broad scope and careful study of individual cases and their histories are absolutely necessary to correct diagnosis.

THE DIAGNOSIS AND TREATMENT OF SCARLET FEVER

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In approaching the subject of scarlet fever the author does so knowing he has a most difficult task before him. The reason for this is that so much laboratory work and other investigations are going on in regard to this disease that it is almost impossible to make this paper "right up to the minute," as the author would desire it to be. However, even if something is overlooked in other parts of the paper, those parts relating to symptoms, diagnosis, and treatment will, I hope, be most complete, and perhaps, after all, to the busy general practitioner these three plus prophylaxis are the most important items of any disease. To have "at his finger ends" this knowledge of the various conditions that he is most likely to meet with during the day's work is what makes a good physician or surgeon, after all. We all know it is a most serious disease, and yet it is very often overlooked entirely or misdiagnosed. The mistake most usually made is confounding it with measles or so-called "indigestion rashes," or *vice versa*—serious mistakes both ways, I need hardly tell you. For the sake of the patient's welfare and the health of those around him, not to mention your own reputation, you cannot afford to make the grave error of not recognizing or of misdiagnosing this disease. On the other hand, your patient's family will never forgive you the trials and tribulations of an unnecessary quarantine, such as the presence of scarlet fever would entail, because you called an "indigestion rash" scarlatina. You all smile at the impossibility (or should I say the improbability?) of such a mistake being made. Yet a truthful answer to your smiling unbelief is that it is, unfortunately, a daily occurrence. Scarlet fever, like perhaps every other disease or pathological condition known to medicine, stubbornly refuses to conform to our text-book description of it, and that is perhaps the main reason why errors in diagnosis are not uncommon. It is also one of the many reasons why didactic teaching and clinical exhibition and demon-

stration must go hand in hand to result in actual learning. But, as the much-quoted Kipling would say, "That's another story."

The public is as much afraid of scarlet fever as it is fearless, and unjustly so, in measles. It "pooh-poohs" measles but gets terror-stricken in the presence of scarlet fever. There is real cause for alarm in both cases but, of course, scarlet fever is the more serious disease of the two. I may state right here that many of the complications of scarlatina are perhaps as serious as the disease itself and are more lasting in the matter of the damage they cause. So here, again, is another most excellent reason for knowing all about this very dangerous disease of childhood. Among the laity it is a common belief that scarlet fever must always leave its mark.

Of course this is not so, but it is true that many times when it does leave "its mark" it is the fault of the attending physician's not having been on the alert for complications, and this should not be. Every medical man should feel that it rests with him whether the public loses faith in or increases its confidence in the profession at large, and therefore that so far as is humanly possible, his work should be above reproach.

We all will make some mistakes but our aim should be to keep down the number to the lowest possible count. With these few introductory remarks as to "the why and wherefore," let us proceed.

All concede that measles is the most prevalent disease of childhood. Scarlet fever comes next. I am very happy to be able to state, however, that as regards scarlet fever physicians and the laity do not have the same erroneous idea that many of the former and all of the latter have in regard to measles—that all children must have it. Otherwise scarlet fever might be a closer competitor for first place and the mortality rate for children very much raised. Another reason why scarlet fever is not so prevalent is because both the laity and physicians are more careful of establishing a proper quarantine, the public, in avoiding the cases, and the profession in enforcing rules for safety, for scarlet fever is an acute, infectious disease as all of you know. Its virus, however, is evidently less toxic, at least so far as contagion goes, because the disease is contracted much less frequently among those who are exposed to it than is the case in measles. That its virus is very harmful to its host, however, is shown by the course of the illness itself, its complications and its sequelæ.

I could quote here some statistics to show its relative prevalence at all times, but I will content myself with saying that it might be classed as a disease which is endemic, and which at certain seasons of the year is very likely to assume almost epidemic proportions. The statement that "where there are children there is measles" is true to a lesser degree as regards scarlet fever, and as every community boasts more or less of a juvenile population, cases of measles and scarlet fever are practically to be found everywhere. Adults are subject to measles but are fairly immune from scarlet fever, although they do get it at times. I believe it is true that with adults with scarlet fever, the disease of a given type is always more serious than the same type would be in a child. This seems to be true of most of the typical diseases of childhood when contracted by an adult. All children exposed to scarlet fever do not contract it, very fortunately, and the older the child exposed, the seemingly more resistant he is to the scarlatinal virus. Scarlet fever is a very widespread disease, all parts of the world, civilized and otherwise, have been ravaged by it, have suffered from its presence in their midst.

So far as I can ascertain, all writers agree that males and females are about equally attacked, and from 85 per cent. to 90 per cent. of the cases occur before the tenth year of life. Of these the greatest number are in children of five years or less. Perhaps it is safe to say that fifty per cent. of the children below the age of ten years who are exposed to the disease come down with it. In infants it is the exception and not the rule, and very young babies seem practically exempt from it.

Some authorities state that the Caucasian race is more susceptible to the disease than are the negro or other races, and that until quite recently it was practically unknown in the Malay race. The presence of scarlet fever does not prevent the advent of the other exanthemata; a fact which must constantly be borne in mind. It can exist in conjunction with them either as a primary or secondary disease. The virus of scarlet fever can be carried by another to a third person besides by direct infection. In this way it differs from measles which is rarely carried by a third person. The virus of measles, while very intense is evidently very much less resistant than that of scarlet fever, the latter being very long-lived and retaining its toxicity for almost an incredible length of time. This seems proven by the fact that

almost every child who is exposed to measles comes down with it, whereas as already stated only about fifty per cent. of the children exposed to scarlet fever are attacked by it. Of course, the way the disease is spread is mostly by direct contact, and this direct contact usually takes place in the schoolhouse where the children are gathered in large numbers. This is one of the reasons why I am opposed to kindergartens or any place where children under the age of six years or seven years are allowed to gather. The day nursery could very profitably be done away with and the state pay the mothers the small amount they earn while the babies are deprived of the mother's love and care. After the age of six years the liability to contract children's diseases is less. Scarlet fever is most prevalent during the fall, winter and early spring. The most severe cases are usually in the cold months, but October, which in this climate at least is not very cold, seems to have the highest mortality. We will speak of the rate of mortality later when we discuss prognosis. The disease can be spread by animals of the domestic varieties as well as in food, especially milk, and any other article that has been in contact with the virus of the disease. Defective drainage may convey the virus (Osler). It is highly probable that vomitus, urine, sweat, and other body secretions and excretions may carry the infection. The tenacity of the virus is demonstrated by the fact that the furnishings of the room wherein a scarlet fever patient has been kept ofttimes become a carrier of the disease. The same can be said of toys, books, clothing, etc. It might also be said here that one attack of scarlet fever does not confer future immunity, although it is also true that recurrences after a space of time are not very frequent.

Cautley describes scarlet fever as a disease of the skin and throat with many complications, and says it is mild, apart from streptococcal infection, and further states that the complications and fatal results are due to this cause. Holt states that the only characteristic lesions of this malady are those of the skin and the mucous membranes of the mouth and throat. Osler and other authorities also call attention to the fact that there are no specific lesions; so that you will readily see that what can be said about the pathology of the disease is very little. What I have to say will be practically only a composite picture from the works of several other authors. In fact, I might state here that my entire paper is based on the much larger experiences of others

plus the much smaller experiences of my own. Under the heading of morbid anatomy might be stated that the changes in the throat are those of simple inflammatory or follicular tonsillitis. That only in the hemorrhagic form does the skin show any traces of the rash after death. Endocarditis and pericarditis are sometimes found. In certain cases only are there kidney changes. In cases that die from pseudo-angina, a condition of broncho-pneumonia is very often found. The spleen may be enlarged in some cases. In very severe cases there will be a pseudomembranous angina, extensive lymphadenitis, and an inflammatory œdema of the cervical tissue. This latter may break down and suppurate or become gangrenous. Changes of an interstitial nature have been found in the liver, and gastro-intestinal catarrh is present. There are changes also in the other body viscera but none of them can be said to be typical of scarlet fever, so perhaps I had better omit them, fully realizing as I do that I have said very little, if anything, about the pathology of this disease.

The bacteriology of the disease needs but little mention as far as one's knowledge of it goes. Both the protozoön and the streptococcic theory have their advocates; but neither faction has as yet proved its case. Formerly the streptococcic theory had many more advocates than it has now perhaps, and most of the sera as yet tried in a curative sense have been made from various cultures of streptococci. Moser's serum, the most popular one as yet so far as results go—and that is not saying very much—is prepared from bouillon cultures of streptococci, the bouillon having been inoculated with blood from the hearts of patients who have succumbed to the disease. "Cyklasterion Scarlatinale" (Mallory) and "Chrysautozoön Scarlatinæ" (Gamoleia) have been advanced as the specific cause by the various believers in the protozoön theory, who hold that the streptococci are present as the result of secondary infection. There is no doubt that even though not the specific cause, streptococci do play an important part in this disease, especially in the causation of complications. It is to be hoped that the actual exciting cause will soon be discovered, as its discovery will probably assist those who are endeavoring to work out a specific which will conquer the ravages of this disease.

The question as to how the entry of the scarlatina virus into the body is secured is a very mooted one. Certainly the upper respiratory tract must be considered as one portal of entry, as the pharyngeal and throat symptoms, especially the latter, make up a large part of the

disease. Also, if so-called surgical scarlet fever is true scarlatina, one would almost seem justified in stating that the virus can likewise enter through any abrasion of the skin or the mucous membrane elsewhere but in the respiratory tract. But I believe that at the present time there is a tendency to doubt that this so-called surgical scarlet fever is a typical scarlatina. At all events, once it has secured an entrance into the body the period of incubation starts. This may last one week. Holt records ten cases where the period of incubation ran from eight days upward to as long as three weeks, but these are unusually long periods of incubation, and it is a pretty well established fact that if from eight to ten days pass after exposure to infection you are safe in saying that the one who was so exposed will not be attacked. It is also quite true, as a rule, that the shorter the incubation under two days the more severe will be the attack. In about seventy per cent. of the cases the incubation period is from two to four days, and therefore this may be regarded as the average time. Over ninety per cent. of the cases occurring give symptoms within seven days.

Suddenly, and practically without any warning, unless at times a feeling of malaise may be called such, and as malaise is not typical of scarlet fever, it could only be called a sign of some oncoming event, you have a very sick child on your hands whose main symptoms are fever, vomiting and sore-throat. If the child is old enough to tell you, headache and a chilly sensation may be complained of, and in young children this onset or invasion may be ushered in with convulsions. While usually the severity of the onset is a fair indication of the probable severity of a simple *uncomplicated* attack of the disease, do not be in a hurry to give a prognosis in the case. The throat involvement in some cases at first is only noticed by examining the throat, as the patient may not be old enough, or in older patients feel enough, to complain about. The early vomiting is not continued. In fact once, and less often twice, is about as often as it occurs, although some nausea may exist. In the ordinary case the intensity of the fever is very noticeable, the temperature rising rapidly to 104° F. and even higher, death in some cases being caused by a hyperpyrexia. Again, it may be stated that in some mild cases 101.5° F. will be as high as it will go, but let me state that as some of the mildest cases in the beginning give the worst results in the end, owing to complications ensuing, I again advise against a too-positive early

favorable prognosis. The maximum temperature may be reached within the first twenty-four to thirty-six hours with the rash out. In the early part of the invasion you may find little in the throat, but this is not for long. Very soon after, if not at the beginning, the changes in the throat become apparent and with them the temperature will rise. The blush, rather a blood-red in color, will be noticed rather lighter in front and gradually growing darker as you go backwards towards the pharynx, and it will involve both the hard and soft palate, the uvula, the tonsils and fauces, and the pharyngeal wall. The tonsils will be an angry red and very much swollen. On the hard palate will appear tiny red pin-point spots. The face is flushed and the skin of the entire body is dry and hot. Great thirst and a constant dryness of the throat are complained of. The gums are red and even the mucous membrane of the cheeks appears to be of a deeper color. The tongue is furred. Diarrhœa may be present, but I think the tendency in this disease is more towards constipation. With the high temperature the heart-rate is accelerated and the entire picture presented to you at this stage of invasion is that of a very sick patient with all the symptoms of the marked prostration of an acute fever. The entire absence, as a rule, of any acute catarrhal symptoms or a cough is particularly noticeable. Recall the picture of the onset of measles and you will see why this fact is very important to remember while you are examining your patient and arriving at a diagnosis. A little later, after the initial symptoms have appeared, the face has the appearance of being puffy and the flush has become perhaps somewhat darker, but the conjunctivæ of the eyes are unaffected, and the nasal mucous membrane shows no decided change. On the tonsils, little whitish deposits are beginning to be noticeable, but usually it is too early for any definite membrane to be present. The lymph-nodes at the angle of the jaw have become palpable, and palpation causes the patient to complain of soreness. Next the rash of the disease makes its appearance. You may expect this at any time from twelve hours to thirty hours after the initial symptoms have been noticed. It first makes its appearance on the lower part of the neck, the upper part of the trunk, and the flexures of the joints. In some cases it is not seen until the third day, and in a few rare cases, possibly longer. It spreads very rapidly up and down the trunk and the extremities and ofttimes envelops the entire body. If the rash

is slow in coming out I order a warm bath given. This seems very often to expedite matters some. After enveloping the whole body the rash begins to fade and very often at the end of seven days it is gone. In some cases it does not last so long, the average duration may be said to be from three days to seven days.

Before describing the typical scarlet fever rash and its variations I want to say a few words here about when the contagion of the disease is present. Most authorities seem positively to agree that the full degree of contagion becomes active at the beginning of the stage of eruption and continues very active through to, and including, the early stages of desquamation. It is present in lesser degree during the pre-eruptive stage of invasion and the middle third period of desquamation. I believe there is danger of contagion any time when throat symptoms are present, and no patient should be released from strict quarantine while any nasal, aural or buccal discharge persists, even though the usual six weeks to eight weeks detaining period has been passed. So far as I can ascertain the incubation period has had no contagion traced to it. The rash of scarlet fever,—the one found in the great majority of cases,—may be described as a fine, punctate, red rash. Its foundation is an intense dermatitis, fine red spots being scattered on the skin. Special attention is directed to the face, particularly to that part of it around the mouth, where an irregular, somewhat triangular-shaped area commencing beneath the nose and extending downwards towards a limit near the point of the chin, which is left entirely free from any rash, constitutes a rather important diagnostic point. Pressure on the skin at any point in this area produces an anæmia of that part, but the congestion reappears again as soon as the pressure is relieved. In positive cases the rash is deep scarlet red and unless there is something unusual about it, should not be mistaken for the rash of any of the other infectious diseases. With the rash all out the picture presented is that of a "boiled lobster," as several writers have put it; when very intense, many tiny hemorrhages may be seen in it. Peculiarities about both typical and atypical rashes are that the face may escape entirely or only that part of the head may be affected where the rash may have started—back of the ears and along the hair line on the forehead. On the body and on the extremities the rash instead of being confluent may be in patches. It is most intense in the less exposed places, as the axilla,

the groins, along the inner aspects of the upper and lower extremities and within the buccal cavity. Atypical rashes are several in number. A papular rash, which may develop from the usual rash, a hemorrhagic rash; or small yellow vesicles may develop on a red background—Scarlatina Miliaris. A bright red rash indicates good heart action—and its sudden recession is ominous for the heart, which will need immediate attention.

Scarlet fever may be divided into several classes, and perhaps it will be most instructive to take up each one of these classes separately at this stage. The onset in each class and the rashes are the same, so I shall consider them together. In mild scarlatina simplex, the usual symptoms of which at times are so mild that it is very often overlooked until it is suddenly discovered that the child is desquamating, we may expect usually a typical onset. The throat presents the usual congested appearance including the red punctate spots on the hard palate. The tongue is coated, and along the edges and on the tip you will find the enlarged papillæ. The rash may appear at the usual time or may not appear at all. Again it may be a faint blush over the entire body or a typical rash appearing in patches. The face may escape entirely or have merely a few points here and there. It may be all out within twenty-four hours and by the third day to the fifth day entirely gone. The temperature will reach its highest point with the height of the eruption and be normal by the end of a week or sooner. Desquamation may be positively unnoticeable, but usually the "peeling" of the hands and feet can be demonstrated. This desquamation should be well under way by the sixth to eighth day of the disease. Even in these mild cases complications must be looked for and guarded against. The child must be kept in bed and under the same rigid quarantine as in the severe cases.

The contagion from the mild cases ofttimes seems to produce the severest class of cases in those infected with it. Children who get scarlet fever in this form and escape complications are never very sick and if a child does become infected with the virus of this disease he is lucky to escape with this kind of an attack. In this mild type of case, complications being rare, the prognosis is good. Naturally the mortality is practically *nil* and death when it does occur is due to complications.

In medium scarlatina simplex, you have the above described

picture in a more severe way. You have the typical onset of vomiting, high fever, sore throat, chilly sensations, and headache. In this form and in the more severe type, in younger children it is not surprising to find convulsions occurring as part of the invasion. With the rise of temperature, the rash starts to come out. Both reach their intensity at the same time, the temperature very often going to 105°.

The greater the intensity of the rash the more severe the attack is going to be. In this class of cases the rash will spread rapidly and involve the entire body, including the extremities within thirty hours to thirty-six hours after the invasion. The throat here shows more than in the above-mentioned type of cases. The soreness is usually quite marked and owing partly to this soreness on swallowing there is an indisposition to really eat or drink—and here the child is between two fires—there is a marked thirst and yet it hurts very much to swallow.

The throat is red, the tonsils, the pharynx, the fauces and the hard and soft palates, including the uvula, all being involved. On the tonsils are small spots of a rather dirty yellow appearance. Some of these may run together and cause distinct patches. In this form daily throat cultures are certainly in order.

The tongue is more characteristic than in mild cases. At first it will be coated, with only the edge and tip showing red and swollen papillæ; later it will show the somewhat diagnostic symptom of "raspberry" or "strawberry" tongue (either term may be used), which is simply a very red tongue with a complete enlargement of the papillæ. Nasal discomfort or "stuffiness" may be present accompanied by a thin pus-like discharge. An examination of the neck shows enlarged and tender lymph-nodes at an angle of the jaw. The patient is quite a great deal more prostrated than in the mild cases and he has more to fight against. The rash and the high temperature and the all-around discomfort persist. The continued high temperature brings in its train other evils, such as a nervous restlessness, irritability, and even delirium. The rash remains full and bright for a few days after it is out, but between the third day and the fifth day it begins to disappear usually from above downward, and so rapid is the fading that by the end of the week it is practically gone and desquamation proceeds as the next step in the disease.

The temperature runs along pretty well, with the disease rash

reaching its maximum about the same time as the full rash and beginning to decline with the recession of the rash. But it recedes more slowly, and, whereas the rash has almost disappeared by the eighth day, the temperature rarely reaches normal before the tenth day or the eleventh day, and it may take even two weeks. If complications set in, naturally the fall in temperature will stop, and it may even rise with startling rapidity. If it does, immediately look for the cause. It will probably be the ears—a complication which may occur at any time between the end of the first week and the beginning of the second week. The lung complications or a late nephritis must also be considered among the possibilities. Do not forget that in all types of cases ear, throat, chest, and urine examination should be part of the daily routine. The prognosis here is more doubtful owing to the great liability to complications and the toxæmia of the disease being sufficient to overwhelm some of the younger and weaker patients. The heart will require close watching in most of these cases. Remember what has already been said about the heart in relation to the rash. Cold cyanotic extremities also must be watched for.

The severe cases of scarlet fever simplex are the ones that both directly and indirectly add to the mortality tables of the disease. The incubation when traceable is found to be an extremely short one with the period of invasion crowding hard upon it, and in turn being pressed upon by the full symptomatology of the disease. The picture presented to you from the very start is that of a very sick child—one who is really seriously ill and in danger of his life. You have the usual abrupt onset already described in the last class and such part of it that can be more severe is here accentuated.

The temperature mounts high almost at once, and within from three hours to six hours from the onset the scarlatinal rash is not only out but has enveloped the patient from head to foot. In the throat, at first, you have only the picture of a moderately severe case, but that does not last long, for from sixty hours to seventy hours after the onset the little specks at first seen on the tonsil become larger and finally coalesce into quite good-sized patches of a membranous nature. These patches may spread in all directions from the tonsils. This type, owing to the intensity of the throat symptoms, is also known as Scarlatina anginosa vel septica, and that it is well named

can be seen in well-developed cases when your examination reveals the tonsillar secretion on the palate, the uvula, the pharyngeal walls, and up into the nose and ears, and the entire mouth, one might say, is filled with a foul-smelling discharge.

The lips are dry and cracked. Sordes appear on the teeth. There is a good deal of nasal discharge and usually a great amount of cervical adenitis is present. All the symptoms of the medium cases are present in increased severity. The nervous symptoms in this form are often of the "typhoid" state, which may or may not be preceded by active delirium. The temperature in this type of case persists, the recession not starting until the end of the second week or it may go higher until death intervenes. As may be expected, the heart will be greatly affected with this severe toxic condition existing and must be most carefully watched. A rapid weak pulse is the rule and it may be irregular in action. Complications set in early—the eighth or the ninth day may find a double otitis media present and careful examination of these may show a bronchitis, which will rapidly develop into a broncho-pneumonia with or without pleurisy. The urine will show at least a febrile albuminuria. The second week in this case seems to be the critical one, for it is from the seventh to the fourteenth day that most of the deaths occur. During this week of suspense for all concerned the throat symptoms may become worse and go on to gangrenous changes with extensive internal and external loss of tissue, giving rise to hemorrhages fatal to the patient; the heart condition may show an endocarditis in a pericarditis going on to exhaustion or death or toxæmia may cause the fatal termination. Other causes of death may be nephritis, extension of the otitis media, broncho-pneumonia, pleurisy, diphtheria, or a combination of any of the afore-mentioned conditions. Study your urine in these cases most carefully and in conjunction with your clinical signs. Don't neglect to take throat cultures regularly and administer antitoxin as early as possible if it is indicated, and don't waste valuable time in the beginning by administering small doses. If it is necessary at all it is needed in the full therapeutic dosage. After the second week you may feel a little easier. Your prognosis is a trifle better, but your patient is still in danger from any of the complications until he is well on the road to convalescence. Of

nephritis one has almost always to be afraid and many of these cases are attacked by it very late in the disease with fatal results.

There is another type of scarlet fever variously known as Scarlatina maligna, Cerebral Scarlet fever, Toxic Scarlet fever, and Scarlatina hemorrhagia. The main thing to be said about this type of the disease is that the mortality connected with it is about one hundred per cent. The recognition of it is not easy. Most authorities agree that it is rare. Personally I do not recall having seen a case. I, therefore, present here a composite picture drawn from the works of the several authorities to whom I have already acknowledged my indebtedness in preparing this article. The onset is very sharp, violent, and sudden. Convulsions are common, and the development of a state of coma is only a matter of a few hours. The prostration is extreme and the temperature is abnormally high, 106°–108° F. The patient is cyanosed and the pulse on examination is found to be frequent and feeble. The rash may or may not appear before death and it may be of the hemorrhagic variety. The respiration is shallow and hurried and the entire picture is that of a child poisoned unto death by a most virulent poison. Fortunately death comes to relieve the suffering in from twelve to thirty hours, usually.

Of the so-called surgical scarlet fever there is little to be said. It is supposed to be a scarlatinal infection occurring in the course of a surgical condition. Care should be exercised in making such a diagnosis because many things give rashes which may be confounded with scarlatinal rashes. The mortality rate is high.

Although in going over the various classes of the disease I have touched on the changes in the various parts, it might be time well spent to go over some of them at least in a little detail before taking up diagnosis and differential diagnosis. There are four structures that enter our minds immediately scarlet fever is mentioned: (*a*) The throat, (*b*) the ears, (*c*) the lymph-nodes, and (*d*) the kidneys, so we will speak of these first. In the throat besides the rash we will find one of three conditions, the simpler ones may become more serious as the disease progresses. In mild scarlatina you have a congested throat showing little red spots on the hard palate and swollen tonsils on which are minute spots dirty yellow in color. Unlike diphtheritic exudate they can be easily wiped away without injury to the tonsillar

surface. This condition gets to its maximum intensity with the fever and the rash and recedes accordingly.

In some cases of medium scarlet fever and in most cases of severe scarlatina we have another kind of throat—a membranous angina. You first have the mild throat just described above, but in about thirty hours to thirty-six hours from the onset you find that the tonsillar exudate is rather inclined to run together, and is of a membranous consistency. Its color is different. It is a yellowish green, a dirty gray, or it may be very dark. You will also notice that it is not limited to the tonsil but extends all over the throat structures and also involves the ears and the nose. Gangrenous angina—usually fatal—is explained by its name, so nothing further need be said of it, except that it is only seen in the severest cases of the disease.

The ears in scarlet fever are the seat of an infection which has travelled up through the Eustachian tube from the throat. Involvement of the ears is the most frequent complication of the disease. It is practically safe to say that both ears are always attacked and that at the same time, even though rupture of both drums does not take place simultaneously. It may take place early or late in the disease. If late, while the temperature has been declining, it will cause a rise, otherwise pain, discharge, or difficulty in hearing may be the first thing to call your attention to this complication. Permanent deafness or chronic otitis may result from this.

The lymph-nodes in this disease, especially those of the cervical regions and groins, are enlarged and tender. In combination with great inflammation of the cellular cervical tissue it forms the so-called anginous collar or "bull-neck." These glands may break down and suppurate or become gangrenous. This usually only takes place in severe cases, and as a rule only the cervical glands are involved. A general breaking down of the nodes would indicate a very bad prognosis. Suppuration of the glands usually does not take place until the maximum intensity of the attack is over.

The kidneys in scarlet fever have a vast amount of toxic substances to rid the system of and, therefore, it is not surprising that under the strain their normal resisting power becomes lowered and their tissues become affected by the poison of the disease as it passes through. In order to dilute this poison we urge water on our patients and it is because we hope to overcome some of the toxic

agents that we administer hexamethylenamine. The changes may be only in the interstitial tissue or have involvements of the glomeruli and other parts. This kidney condition may cause death or leave permanently damaged kidneys. Nephritis may be present early or late.

The tongue in scarlet fever is important. Early it is swollen and thickly furred with only the edges and tip showing red and with prominent papillæ. Slowly the tongue clears up and more swollen and red papillæ show through. The appearance has been likened to that of an unripe strawberry. About the third or fourth day the tongue starts to desquamate, beginning along the edges and foremost parts and travelling backwards. About the fifth or sixth day the "raspberry" tongue is seen. It is a red, clean, raw looking tongue, the papillæ showing very prominent. The desquamation of the tongue should be complete about the fifth day and varies with the severity of the case, and becomes normal by the end of the first week to the eleventh or twelfth day.

The skin, besides being the seat of the rash, may have hemorrhages into it, and it may also be destroyed with the underlying cellular tissue through the formation of abscesses. There may also be gangrenous changes. The cervical tissues are usually affected.

The heart may be the seat of endocardial or pericardial changes during the course of the disease. Scarlet fever ranks second to rheumatism in this regard and not infrequently not only are the joints involved in the scarlatinal infection but real acute rheumatism may be present in the course of a scarlet fever, of course adding a most undesirable grave complication to the disease.

The diagnosis in scarlet fever is not always easy, but in any case where you are suspicious of it institute at once a rigid quarantine until you are sure it is not. Be especially careful in getting children out of the way, because, remember that from six months to six years of age at least fifty per cent. to sixty per cent. of the children so exposed contract the disease and that even up to ten years of age there is quite an active lack of immunity to the disease. And may I digress a moment longer from diagnosis to state that children who have been in contact with a suspected case should not be allowed to mingle with other children until the diagnosis is arrived at, and, if your suspected case is a positive one, these children should be held in quarantine until the period of incubation is past. In typical cases you will have

a history of exposure (perhaps), a typical sudden visit of rapidly rising fever, vomiting and sore throat, either subjective, objective, or both. Within twenty-four hours a rash will be out and even before this the tongue may show some suspicious changes. Absence of a rash does not bar diagnosis of scarlet fever, for it may have been very slight and therefore overlooked by you or faded before you were even called. Also there may have been no rash. The presence of a scarlatinal looking rash does not mean scarlatina. Many other things cause rashes. Therefore, the rash in conjunction with the above-mentioned symptoms is a diagnostic aid. These same statements can be applied to the "strawberry tongue." Desquamation, especially on the hands and feet, is a diagnostic point. A white line at the junction of the finger-nails and the finger-pulp in conjunction with a characteristic tongue is diagnostic (McCollom). This finger symptom is a late one and is usually most marked on the thumbs. The pulse helps a little, as in scarlet fever it is out of proportion to the temperature. The main things to go by, however, are the period of incubation, if you can ascertain it, the very typical abrupt onset, plus whatever else you can find, not giving much thought to what is absent, for only in very few cases are you going to get every symptom.

The differential diagnosis is important. Measles has a different incubation period of rarely less than one week. The onset is with acute catarrhal symptoms, usually without vomiting, and the temperature rises gradually. Rash also appears later—not until about third day, but this rash is different. Desquamation in measles is always fine—in scarlet fever the scales are coarser, entire casts of the hands and feet often being thrown off. Also, and the most important differential diagnostic point is, in measles you have "Koplik's Buccal Spots." In distinguishing scarlet fever from German measles (Rubella) the thing to be remembered is that in the latter there is usually plenty of rash and very little anything else. This would not be so in scarlatina. Diphtheria must also be distinguished from scarlet fever, and here you must remember that the diphtheritic membrane forms early, is more adherent, and spreads rapidly. At first it is a rather grayish indefinite web-like affair, but changes quickly into a definite membrane. Digestive disturbances, and drug rashes, either from internal administration or external application, must also be taken into consideration.

PROGNOSIS

What prognosis are you going to give in scarlet fever? If you are wise you are going to study your case carefully before you give any at all, because there are several things that are going to count in every case and the "pros and cons" must be carefully weighed before you speak definitely. In the first place epidemics vary very much in intensity generally and also with the season of the year. As already stated, statistics seem to show the greatest mortality in the month of October. The most severe cases seem to appear in the colder weather. Mortality reports show an average of from three per cent. to fifty per cent. at various places, depending upon the type of the disease and the age of the children attacked. Perhaps it could be said safely that the average mortality was from twelve to fifteen per cent., but that in cases under five years of age a higher mortality must be looked for, increasing even up to fifty per cent. in the youngest patients. In the so-called malignant cases of the disease the prognosis is absolutely bad, your patient being overwhelmed by the poison of the disease, death results in anywhere from twenty-four hours to forty-eight hours from the onset of the malady. You may have another type of cases where the toxicity of the disease does not overwhelm the body at once, but by its continued onslaught weakens the vitality of your patient to the point of exhaustion, leaving him an easy victim to complications which will bring about a fatal result, or he may pass beyond from the exhaustion itself.

Another type of case is that in which the toxæmia of the disease brings about fatal results through a nephritis.

In addition to the foregoing you have the following helps to assist you but none of them are constant, so that your deductions must be drawn from them collectively. The rash varies directly with the severity of the disease and the brighter its color, the better the heart is withstanding the scarlet fever toxins. The temperature helps some also, not by its height at the maximum intensity of the disease, unless it is abnormally high, but by its curve which after the maximum has been reached should show a steady morning gain towards normal each day and the daily rise should not reach as high a point as it did on the preceding day.

A sudden rise in temperature, please bear in mind, means trouble,

so immediately ascertain which complication has set in. There may be more than one. An unexplained fall of temperature suddenly coming on is likewise not a source of congratulation until you have searched thoroughly and ascertained beyond a doubt that it is not an indication of something detrimental that has happened to your patient. Severe prolonged throat symptoms make the prognosis grave, as does early intense swelling of the glands in the cervical region. Remember also that your prognosis should include only the outcome of the scarlet fever uncomplicated, for the onset of complications may change the outlook entirely for the bad. Avoid making a prognosis if you can, and if you cannot, be cautious in what you say. Families are peculiarly apt to take what you say as a positive fact unless you make your "maybe" and "perhaps" most emphatic and plain to them. I might add in closing, what I have to say regarding prognosis, that with the great amount of work now going on in regard to this serious pest of childhood "there is light ahead," and there is great reason to hope that in the near future our prognosis will be less serious and gloomy.

PROPHYLAXIS

Prophylaxis in every disease is very important and well worth knowing about. Scarlet fever is no exception to this rule. What can we do, and what can we teach the public to do to lessen the number of cases of this disease that now occur? There is quite a good deal, as you will see, as I remind you of various things. First, perhaps, it will be best to talk about the physician himself. When called upon to visit a patient and on seeing him you make a diagnosis of scarlatina, I would advise you to call it scarlet fever for, for some reason unknown to me at least, the laity believe there is a difference between scarlatina and scarlet fever, and believe the former to be a mild, non-dangerous, and I think I might safely say, non-contagious or infectious form of scarlet fever and are therefore careless in their observances of a strict quarantine—a most undesirable state of affairs. Therefore say scarlet fever, and order the enforcement of a strict quarantine, and be sure to explain fully to the family what you mean by a strict quarantine. Needless to say that the patient should have a room to himself and a single width bed if this latter is procurable. Every unnecessary article of furnishings should be removed from the

room, but should be thoroughly disinfected before being put in with other things. The etiology and the period of incubation in this disease explain why this is desirable. If no nurse is employed, then one member of the family, and one only should undertake the charge of the patient. Several attendants should not be permitted. On the occasion of your visits to your patient you should wear a long, washable gown over your street clothes, a washable cap over your head and face (there are especial caps made for this purpose), and washable gloves, or not, as you prefer. These are put on before you enter the sick-room, and are removed just within or without the sick-room on leaving. As you remove them you place them in a bag, also of washable material, especially provided for the purpose. This bag with its contents is then immediately immersed into a large pan of water. The water is brought to the boiling point, and from twenty to thirty minutes later the bag and its contents are hung out to dry to be in readiness for your next visit. Despite all these precautions you will go still further and thoroughly disinfect your hands and face to the extent of making them surgically clean. The mouth is also to be cleaned with a mild antiseptic solution. You can also, if you wish to be extra careful, rub off the soles of your shoes with a cloth moistened with an antiseptic solution, on leaving the sick-room. Here is an extra precaution that I take to guard my other patients and my own children from possible infection. Perhaps it is unnecessary and may even seem absurd enough to you to cause you to smile. Personally, I believe it to be of real value. On leaving the house of my patient I usually leave both my undercoat and overcoat unfastened and take a brisk walk of half a mile or more to get thoroughly aired. If it is a bright sunny day I take the sunny side of the street. As I have already stated, it may be a useless precaution, although, as I say, to me it seems a good one. The thermometer used on your patient must be left in the sick-room in a mild lysol solution.

Any other instrument used in the sick-room, which cannot be left there, like a stethoscope for instance, must be thoroughly cleaned before you leave the house. Simple urine tests must be made in the sick-room.

If any bottles of urine are to be sent outside for examination be sure that the bottles are placed in a basin of antiseptic solution after

they are filled and then only handled with clean hands. The prophylactic measures for the nurse or attendant are as follows:

She must be just as careful as the physician in the precautions every time she leaves the sick-room, which should be as little as possible.

If she is not going to stay in the sick-room most of the time then she should remain immediately outside it, only entering as it is necessary. You see the idea is that there should not be a number of unnecessary journeys to and from the sick-room with the possibility each time of spreading the infection.

She must see that all the excretions of the patient are thoroughly disinfected before they are removed for final disposition. She must be instructed that everything from or used on the patient should be burned.

Things that can't be burned, must be boiled or put into a reliable disinfecting solution for at least an hour. The cleaning of the room should be done with cloths moistened with antiseptics. She must see to it that all the bedding, dishes, glassware, etc., are first disinfected before the usual washing for cleaning purposes. She must be firm in seeing that all your quarantine rules are enforced and she must be particularly firm in excluding company.

Scarlet fever patients do not need "afternoons at home." The quarantine as it affects the other members of the family should be as follows:

If they feel it necessary to visit the sick-room they should observe all the precautions the doctor and nurse do. The visits, which should be of short duration, should take place at the end of the day when they are going to remain at home, and not at the beginning of the day when they are apt to be going out again and mixing with other people. You can easily see the point. Not only the family but the general public is to be thought of.

Friends, relatives, and others not living in the same house or apartment as the patient are requested to remain away. Any members of the family who attend school or college should remain away until the period of incubation is passed. This period of incubation should be a mild sort of a quarantine, so far as mingling with others is concerned, in some other house. If carried out in this way, after the period of incubation is passed they can return to school or college,

provided, of course, they will continue to live away from home. Otherwise they must remain away until the entire case is over and the premises disinfected. While away from school they must not be allowed to mingle with other children. The virus is not just "catching" at school. I repeat what I said in my papers on "Measles": "It would seem to me that when a case of measles (*i.e.*, in this case "scarlet fever") occurs in a class it would be a good idea to have the non-immune members of that class get a ten days' vacation to see if any of these non-immune members have become infected. In case one has he would then have no opportunity to infect others." At this time the school can be thoroughly fumigated which should be done every little while anyhow. I would also suggest that the parents of all non-immune children be notified immediately when scarlet fever breaks out in a class so that they can be on their guard against the disease in their children.

Early symptoms of this disease should be noted on the cards sent to the parents to help them notice symptoms early. I said practically all these things in my "Measles" paper.

Prophylaxis in most diseases is simply another way of saying to the doctor, "use your knowledge," and to the public, "do unto others as you would have them do unto you."

In starting to talk about treatment the first statement to be made is that there is no specific treatment as in diphtheria.

Treatment differs with various physicians. Every case in fact will require special study, for each case will differ in severity, complications, etc., and you will have to meet conditions as they arise. In some cases the end of the disease (*i.e.*, death) will come so quickly that you won't even have time to be sure of your diagnosis. In others the complications will by far overshadow the scarlet fever. The first matter to be considered is the sick-room. The best and most cheerful room belongs to the patient. He is going to occupy it a long time and in the latter part of the convalescence the more cheerful the room the easier it is going to be for him, for the nurse, for the family, and for the doctor to stand the trials and tribulations of this long period of confinement. The room must be kept well-aired but not cold. It need not be kept dark as in the early stages of measles, yet naturally, strong light must not be permitted to beat into the eyes of the patient. Likewise he must not be exposed to drafts, nor must

the temperature of the room be allowed to go much below 65°. The patient must have enough bed clothing to be comfortable, but not so much as to cause discomfort.

It must be borne in mind, particularly during the time of the disease when the patient has a high temperature, that he is not so susceptible to the cold. The first medication that I usually order is directed towards the cleaning out of the gastro-intestinal tract and for this purpose I know of nothing better than either castor oil or calomel.

I do this in practically every condition unless a catharsis is contra-indicated, for I am a very firm believer in preventing absorption from a foul gastro-intestinal tract. If the rash is not coming out quickly enough I do not hesitate to order a warm bath followed by a good, stimulating rub. Perhaps the next matter that merits very strict attention is the diet. And here one must be very careful. A fluid diet while the temperature is high, or for the first three weeks, has always been recommended, but I think, at the present time, the inclination is to be a little more liberal in the matter of diet if the patient can swallow easily and seems to digest well what is offered. The idea of an all-milk diet is the fear of kidney complications. Schick, of Vienna, states that in his service they allow, in addition to milk, malt-coffee, cocoa prepared with milk, farina, rice, and flour and milk, farina mush, milk-toast, or cooked rice.

Cautley, of London, seems also to adhere to the more liberal diet.

In my own work I have been guided a great deal by the apparent needs of my patient, being quite liberal in the matter of diet with the exception of meat, but never urging food upon my patient. Where I can get along with a very light diet I do so, recommending home-made, whole, fat buttermilk instead of milk, if I can get the patient to take it, and insisting that fluids in the form of water, orangeade, lemonade, or limeade be given freely during the day. It is in these drinks that I administer hexamethylenamine which I give as a matter of routine in practically every case. Of course in using a liberal diet one must be guided by the wants of the patient and must pay particular attention to the amount and content of the urine elimination. He must also be careful to keep the gastro-intestinal tract clean. Unless the physician is going to make a urine examination, including a record of the amount passed daily, a part of his daily routine, I

should most strongly advise him to stick to a very restricted diet. As convalescence progresses the diet is correspondingly increased and more variety offered to meet the increasing demands of the patient.

The temperature in scarlet fever may also require attention, but here again it must be borne in mind that it is apt to be high during the first part of the disease and its endurance is going to depend upon the severity of the case and the complications that may ensue. Rarely, if ever, are the antipyretic drugs used.

The best antipyretic is cold in the shape of cold sponging, the cold pack or the evaporation bath. In severe cases the use of antipyretic measures must be watched with great care while being administered.

The next thing to engage our attention is the skin. The patient will complain of itching and burning and a sort of indefinite discomfort.

This may be controlled by several different things. At the Private Hospital for Diphtheria and Scarlet Fever patients in New York, Sturtevant reports that his patients get great relief by gentle sponging with a 0.5 per cent. dilution of liquor cresolis compositus; Cautley claims that inunction with a five per cent. ichthyol ointment, not only controls all the skin discomfort, but reduces the temperature, helps soothe the nervous irritability, and improves the general conditions. I have found weak carbolic lotion or borated vaseline of quite good service in this condition.

During desquamation in order to prevent the scales from being scattered about, the following measure is adopted: the child is given the daily usual warm bath with castile soap and water and is then rubbed with either carbolized vaseline or an ordinary boric acid ointment; the soles of the feet, which are the last to desquamate, are sometimes painted with tincture of iodine to help desquamation along.

Milne, of England, claims that oil of eucalyptus rubbed into the skin of the entire body twice daily for the first four days of the disease and once daily for the following six days, in conjunction, for the first two days, with a ten per cent. solution of a carbolized oil applied to the tonsils every two hours, will not only shorten the entire course of the disease but will diminish its contagiousness. E. Koerber, at the Eppendorff Hospital, at Hamburg, states that the disease is not shortened by this treatment nor is its contagiousness diminished, but that

the occurrence of complications is decreased markedly, particularly endocarditis, otitis, suppurating glands and nephritis.

The joint complications, however, appear to be increased and the mortality practically unchanged. I have already spoken of the necessity for a clean gastro-intestinal tract, but of course one cannot continually use castor oil, or calomel. I object to the use of saline laxatives for this purpose on account of their removing a large amount of fluid from the body via the gastro-intestinal tract, and, therefore, I use, when necessary, rhubarb or cascara in minimum doses. In many cases of scarlet fever constipation is quite a persistent symptom and therefore must be looked out for.

When the eyes require treatment boric acid may be used or a solution of any of the various silver preparations. The nose, in some cases, requires attention owing to the tendency to a "stuffiness." For this I use an ointment consisting of camphor gr. 4, menthol gr. ¼, eucalyptus m. 32, boric acid gr. 3, petrolatum q.s. ad oz. 1. This ointment may be used in the nose every two-and-one-half hours.

The care of the throat next engages our attention. In children old enough gargles are used to keep the throat clean, whereas in younger children irrigations are given. Externally, cold compresses are applied, although some authorities prefer hot applications. The throat must be carefully watched for the onset of any symptoms or changes indicating the beginning of a diphtheritic infection, a complication unfortunately only too common in cases of scarlet fever. Of course, the moment such a condition is found to exist five thousand units, at least, of antitoxin should be administered at once. As a matter of routine I make a daily culture of the throat.

Pains in the joints may be controlled by the alkali-salicylate treatment plus light massage or soothing liniments. In rare cases these joints may suppurate, necessitating surgical interference.

In the course of the disease the lymph-nodes of the body swell but usually require little or no attention, the application of the cold-pack to the throat taking care of the cervical nodes, the only ones which practically ever require surgical procedure. If surgical procedure is required, why of course early free incision should be done.

The heart, in scarlet fever like in any other disease, must be watched and strengthened as necessary. Alcohol, strychnine, or digitalis may be used.

In the lungs, broncho-pneumonia or pleurisy may occur and these must be treated accordingly. Exudates may, in fact, be aspirated early.

Should measles occur it must be treated as if it were a primary condition.

The gastro-intestinal tract scarcely, if ever, needs any attention after the initial nausea and vomiting.

I have purposely left until the last the two most common complications in scarlet fever, that of the ear and that of the kidneys. It is a question whether the ear complication can always be prevented, but it would seem, that—with the routine practice of administering hexamethylenamine and seeing that the patient gets a sufficient amount of fluid to dilute the toxins of scarlet fever—the kidney complications should be very, very much lessened. Regarding the ear the physician should make a daily inspection and anticipate any rupture of the ear-drum by making a prompt incision.

The treatment is then that of an independent condition. As regards the treatment of a scarlatinal nephritis one must follow the treatment laid down for an acute, diffuse nephritis. It would take up too much space to detail it here.

The average length of time that your patient should be kept in bed should be at least from three to four weeks and only then should he be permitted to sit up if the disease itself and any complications are entirely cured. From eight to ten weeks should elapse before the patient is permitted to mingle with or sleep with other children and for two days before being released from absolute quarantine the child should be thoroughly bathed and scrubbed with antiseptic soap, particular attention being given to the hair, scalp, folds of the body and the spaces in between the toes and fingers; likewise to the ears, nostrils, etc. It goes without saying that no clothing that the child has had in the sick-room at that time should then be used.

A little about the serum treatment of scarlet fever and a few general remarks and I am through. What I am going to say about the serum treatment of scarlet fever is based on the experiences of others.

I have had none of my own. The serum of von Leyden, made from the blood of convalescent scarlet fever patients, did not give satisfactory results.

Marmonek's polyvalent antistreptococcic serum is mentioned in many text-books and articles in a very negative sort of a way, so I should say that results from it have not been judged very promising by those who have used it. Moser's serum seems to be considered the most promising one to date in actual use, which is not a very strong statement in favor of it, because even those who are using it emphasize the fact that they use it only as a last resort and continue every other therapeutic measure besides. Schick (Vienna) states that this treatment should only be used in those cases of doubtful prognosis and those that would prove fatal under ordinary circumstances. He further states that the injections should be made as early as possible, preferably on the first or second day and that the third day will decide whether the serum is going to be effective or not. The serum is ineffective after the fifth day. One injection of 200 c.c. should be used except in cases under eighteen months where only 100 c.c. may be given.

The best results are obtained in toxic scarlet fever, in which he claims Moser's serum is the only remedy that gives the patient a chance at all and in which the injection should take place as early as possible and not as a "last stand" measure, and in cases where the throat symptoms are practically absent or not very much present. Only demonstrated efficient serum should be used and other therapeutic measures, especially those to strengthen the heart, should be kept up. In no case does it appear to prevent complications from coming on. Moser's serum is not easy to get as it is obtained by using bouillon-grown cultures of streptococci, gotten by inoculation from the heart's blood, of dead scarlet fever patients, and getting up an immunity in horses to injections of these cocci. You note that the quantity to be used—200 c.c.—is large also. Severe reaction has been noted after its injection, although I find no record of fatal results.

My closing remarks are in the nature of speculation and suggestion plus just a few words about disinfection after the disease is over. Perhaps all of this can best be explained by repeating what I said in my paper on measles, merely substituting scarlet fever where measles was used.

"The question of disinfection after scarlet fever is at present under discussion. I must confess I favor it if it is done properly

and thoroughly. The fact that scarlet fever is not reduced by it is not surprising, for in the first place most of the spreading of scarlet fever is accomplished during the period of incubation and invasion, and in the second place most of the disinfecting done is done in a most indifferent and perfunctory manner and is therefore rather useless. Until this latter phase of the work is corrected it will be hard to say definitely what the real value of a proper disinfection is.

"Like many others, I sometimes like to think aloud, in the hope that all or some part of my thoughts added to the thoughts of some other person who is thinking about the same problem, may be productive of the solving of that problem. Perhaps some of the things I am going to think out loud about scarlet fever have already been tried and been found of no service, others perchance have not and may prove of value.

"To prove the yea or nay of any preventive or cure one needs a large series of cases in which to observe results, besides a laboratory in which to work. I have neither at my disposal, so I can only theorize, trusting that some one who has what I have not may find some of my theories valuable in actual work. I have already mentioned the use of hexamethylenamine. The discovery of a scarlet fever antitoxin which would act as does diphtheria antitoxin, both as a preventative and a cure, would indeed be a boon. We do not know, however, the exact causative agent of scarlet fever, so to proceed along the lines of the Behring and Kitasato experiments of the latter part of 1890 cannot be done with the same degree of accuracy as if this agent were known, but we could try to render an animal immune by proceeding as follows: A series of animals could be injected with the blood serum of scarlet fever cases in gradually increasing doses, some animals only receiving blood from first-day cases throughout the whole course of the injections, others only from second-day cases, etc., whereas still others could receive injections of the mixed variety with gradually increased dosage, as with the others. These animals can then be tested as to their immunity to scarlet fever and also as to the action of their blood serum on scarlet fever infected animals. Another series of animals could be injected in the same manner with the nasal secretions and the result noted. This same refers to scrapings from the throat, likewise its secretions. If still unsuccessful in our quest, scrapings from the

rash at its various stages, including that of desquamation, could be tried and the results ascertained. The discharges from the ears in scarlet fever cases must also be tested to see what results will be obtained. If any of these various results were what we were seeking for, we could then try to isolate from the particular material that seemed the most fruitful the actual cause of the disease and make an attempt to grow it in pure culture and study it and its toxins. This would help us to prepare a better and more concentrated serum than using the gross material of above.

"Why should not experiments of this kind be likely to lead to good and beneficial results? Plenty of experience has shown us that the disease is transmissible; therefore the cause of it must be something that can be carried or transmitted. To save time and space we will say that this must be a bacillus, using the term in its broadest sense. Now, how does the body overcome this invasion? We speak of scarlet fever as a self-limited disease. Why is it self-limited? Either it is self-limited because the body overcomes the invading host and its toxins by getting up an immunity to it, or because the invading host dies. But we know that most so-called germs have spores which develop on the death of the germ itself, therefore unless something overcame the invading host and its spore successors, the body would remain in a state of attack, therefore it seems as if the body does produce something that overcomes the invader and that this something which is produced must be constantly on duty, as it were, because in most instances one attack of scarlet fever produces immunity. This is the substance we seek to discover, or at least, learn how to produce it in the body. We will then have both a preventative and a cure for scarlet fever. In the chemical line there is also room for experimentation. Much has been said about calcium sulphide as both a preventative and a cure. I find it hard, however, to get data regarding it. I understand also it is hard to get good reliable calcium sulphide. The discovery of dioxydiamidoarsenobenzol for use in syphilis will probably stimulate drug experimentation for the cure of other diseases."

THE TREATMENT OF ANEURISMS

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In my last lecture I discussed exophthalmic goitre as a typical disease caused by hypotonia of the vagus. Aneurisms belong to the same category. We must escape a hybrid anatomicoclinical terminology which seeks to conciliate the pathologist and clinician by differentiating a dilatation from an aneurism (literally, a dilatation) of an artery. In defiance of such nomenclators, I shall discuss aneurisms from a clinical and not an anatomical viewpoint.

In studying arteriectasia I shall limit myself to aneurisms of the aorta (aortectasis) insomuch as practically three-fourths of all aneurisms are aortic and nineteen-twentieths of these are situated in the thoracic aorta.

Do not be misled by the belief that aneurism is a rare malady. Its rarity is only in proportion to the lack of skill displayed in diagnosis. The percentage of deaths varies from 0.6 per cent. of total mortality (Emmerich) to 1.49 per cent. (Müller).

Aortic dilatations may be divided into two clinical groups : dilatations without (latent cases) and with symptoms.

I shall not weary you with data ascertainable in any text-book, but shall proceed at once with a consideration of new subject-matter respecting the diagnosis and treatment of aneurisms.

The non-recognition of an intrathoracic or abdominal aneurism is an unpardonable error in diagnosis, and you must not seek refuge for your dereliction in the traditional classification of aneurisms : (*a*) aneurisms with signs and symptoms; (*b*) aneurisms with symptoms but no signs; (*c*) aneurisms with neither symptoms nor signs.

There is a pathognomy of this disease, but beware of so-called pathognomonic symptoms! You must conciliate every possible method in diagnosis, and, above all, seek confirmation of your findings by radio-diagnosis which includes fluoroscopy and skiagraphy.

Respecting the subjective symptoms, permit me to say that

their paroxysmal and fluctuating character are caused by changes in the calibre of the aorta. Orthodiagraphic tracings made by myself at different times during the day have convinced me that the aorta is not constant in calibre. This is equally true of the heart. You can now understand why a temporary increase of aortic dilatation may precipitate a medley of symptoms which disappear when the lumen of the vessel is restored.

Percussion is, without question, the most important objective sign, but it must be executed according to the methods suggested in spondylotherapy. I shall presently recapitulate the methods in question.

If percussion of the thoracic aorta were executed as a routine method of examination, a clinical in lieu of an anatomical diagnosis would be more frequent and many apparently trivial intrathoracic symptoms could be referred to their real source of origin.

The highest point of the aortic arch is distant about 5 centimetres and the beginning 2 centimetres from the anterior thoracic wall, hence a forcible percussion-blow which is propagated to a depth of 5 centimetres cannot fail to elicit the dulness of the aortic arch if dilated.

We have been swayed by the dogmatic traditional dictum that a percussion-blow is only propagated to a depth of 5 centimetres, hence any airless structure beyond this point will elude detection by percussion. I shall disprove this fallacy when my methods of duodenal and colonic intubation are demonstrated.

Place a stomach-tube in contact with the posterior surface of the chest, and then, by percussion of the anterior surface, attempt to locate its position.

As a rule, if you are reasonably skilled in percussion you may locate the site of the tube, no matter in what position the assistant may have placed it.

You recall that many of the viscera are under the control of the vagus, and when the tone of the latter is increased, topographic percussion is abetted. This statement likewise refers to the aorta.

You may increase aortic tone by having the patient forcibly extend the head during percussion, or, better still, you may have an assistant execute pressure at the seventh cervical spine to increase vagus-tone. Remember that the pressure must not exceed 30

seconds' duration at one time, otherwise you will exhaust the afferent impulses to the vagus. You may repeat the manœuvre frequently, but do not extend the pressure beyond the period cited. Also remember that the aortic reflex is of short duration (not exceeding one minute in the norm), and percussion must proceed rapidly.

Learn to disregard the audible quality of the percussion-sound, and ascertain dulness by the sense of resistance, or what is called palpatory percussion.

In addition to augmenting vagus-tone, avail yourself of two other methods if necessary, in accentuating substernal dulness.

One method is to percuss at the time the chest is in the position of forced expiration. A number of measurements show that, during the latter phase of respiration, the sagittal diameter of the chest approximates the arch of the aorta from .3 to 1.6 centimetres.

The resonance of the chest is the product of vibration of the lung-tissues and the thoracic walls, and the summation of this vibration interferes with the elicitation of dulness of airless structures in juxtaposition to the lungs. The pulmonary factor of resonance is partially eliminated by percussion at the end of a forced expiration where there is little air in the lungs to vibrate. The thoracic factor may be excluded by firm pressure on the lower end of the sternum by the hand of an assistant. In the norm the transverse dulness of the aorta at the level of the manubrium extends 2 or 3 centimetres to the right of the median line of the sternum and 1.5 to 2.5 centimetres to the left of the medial line. If the transverse dulness at this point exceeds 5 centimetres, the aorta is dilated.

It is necessary to direct your attention to a condition which if unrecognized may lead you into error.

In splanchnoptosis, cardioptosis is often a concomitant condition, conducing to a dislocation of the aorta which I have neologized as aortoptosis. Percussion shows an extension of dulness beyond the norm, and fluoroscopy demonstrates an extended silhouette of the aorta. Unlike an aneurism, the shadow between pulsations recedes behind the sternum. A pathognomonic test is to have an assistant raise the abdomen, at which time percussion and fluoroscopy show a recession of the dulness and the shadow.

Respecting the accuracy of the vagus-tone method of percussion, permit me to show you skiagrams (Figs. 1, 2, and 3) of aneurisms.[1] The dark line surrounding the aneurism and heart in each skiagram represents the percussional area as elicited by Dr. Geo. Jarvis before the X-ray pictures were taken. You will note that the skiagraphic and percussional findings coincide.

I referred aneurisms to vagus-hypotonia. With this simple instrument (Fig. 4), which is practically a reflexometer, one can determine whether the vagus is orthotonic, hypertonic, or hypotonic. You note that, when the pulse is palpated during the time pressure is executed at the seventh cervical spine, the pulse is temporarily inhibited when the index shows a pressure of 4 kilograms. This suggests the irritable weakness of vagus-hypotonia.

Having given cursory consideration to the symptomatology of aneurisms, let us refer to the *aortic reflexes* on which my treatment of aneurisms is based.

When I discovered these reflexes many years ago by aid of fluoroscopy I regarded their elicitation as an interesting physiologic phenomenon, having little hope that the aortic reflex of contraction could be utilized in treatment.

In brief, stimuli, notably concussion, applied to the seventh cervical spine contracts the aorta, whereas stimuli applied in succession to the last four dorsal vertebræ will dilate the aorta. The former is the aortic reflex of contraction, and the latter the counter-reflex of dilatation.

The latter is employed for diagnostic purposes. Thus, a dulness in the upper thoracic region or in the back corresponding to the aorta may be made to decrease or increase in area by elicitation respectively of the aortic reflex of contraction and dilatation.

The employment of these reflexes in diagnosis is of great value, which I will illustrate by the citation of a case.

A patient with an intractable cough and pains in the left arm departed from San Francisco for Europe to seek further counsel. Various diagnoses having been made and no relief attained, he consulted Kocher, of Bern, who after a week's deliberation concluded that there was a spinal growth and an immediate and serious opera-

[1] These skiagrams were taken by Dr. Geo. Jarvis, of Philadelphia.

Fig. 1.

Skiagram of an aneurism and heart before concussion of the seventh cervical spine.

Fig. 2.

Same case after concussion of the seventh cervical spine. Note the decided diminution in the area of the aneurism.

Fig. 3.

Same case after one month's treatment consisting of concussion of the seventh cervical spine.

tion was necessary. The diagnosis of a growth was based chiefly on a series of excellent radiograms.

When this patient returned to San Francisco the shadow approximating the spine contracted when the seventh cervical spine was concussed (aortic reflex of contraction) and it enlarged when the four last dorsal vertebræ were concussed (aortic reflex of dilatation). The diagnosis of an aortic aneurism was later confirmed by the subsidence of symptoms after two weeks' treatment to evoke the aortic reflex of contraction.

The treatment of this formidable affection consists of stimulation in the paravertebral area corresponding to the seventh cervical spine. I employ concussion in preference to other stimuli. The rationale of the method is essentially the employment of a reflex (aortic reflex of contraction) in treatment. The symptomatic cure is achieved by augmenting the contractility and tonicity of the aorta, and may be likened to the balneologic treatment of heart-disease by Nauheim baths which cause reflex stimulation of the heart, thereby evoking slower and more powerful contractions of the organ.

The stimuli are conveyed indirectly to the vagus through the neuromedullary pathway connected with the third dorsal segment of the cord.

The pharmacology of the aortic reflexes is interesting; they are inhibited by atropine, accentuated by pilocarpine, and adrenalin evokes the aortic reflex of dilatation.

Skiagrams show that the reduction in the area of an anuerism is never in proportion to the amelioration of the symptoms. Percussion may demonstrate an absence of aneurismal dulness in patients symptomatically cured, yet a skiagram may show that the aneurism is only slightly diminished in area.

Such patients have habituated themselves to violent grades of intrathoracic pressure, and any slight reduction of the latter gives relief.

You will observe that I speak of symptomatic cures, for it is an acknowledged fact in pathology that nothing ever gets quite well.

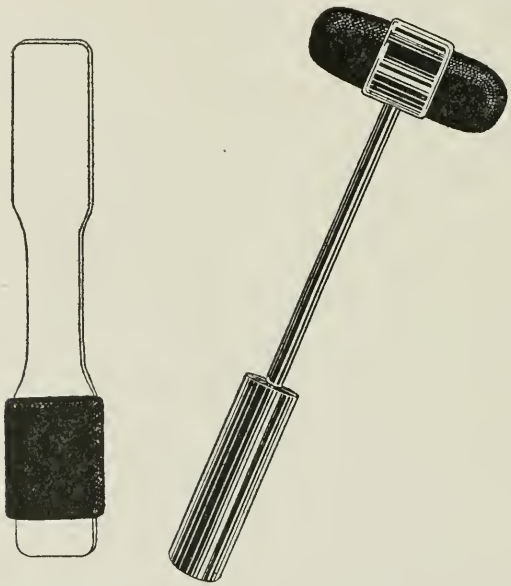
I have seen a number of patients years after their discharge, and they have remained perfectly well.

In my treatment I employed concussion exclusively as a crucial

test, and, having established its specificity, I would no longer eschew any adjuvant measure which can be utilized in treatment, such as inhibition of cough by codein, laxatives, anti-luetic treatment, a plenitude of physical and mental rest, and pilocarpine for accentuating the aortic reflex of contraction. I will say that, up to the present time, I have had no occasion to use adjuvant measures.

Do not use vibration, as so many have done, for you will achieve no results. In the absence of a suitable concussion apparatus use

Fig. 5.



Plexor and pleximeter for concussion in the treatment of aneurisms.

a simple Déjérine plexor and a pleximeter of metal, the end of which approximating the seventh cervical spine being covered with rubber (Fig. 5). Do not exhaust the reflex by prolonged treatment. A séance of five minutes, consisting of blows for one-half minute, then rest for the same period, suffices.

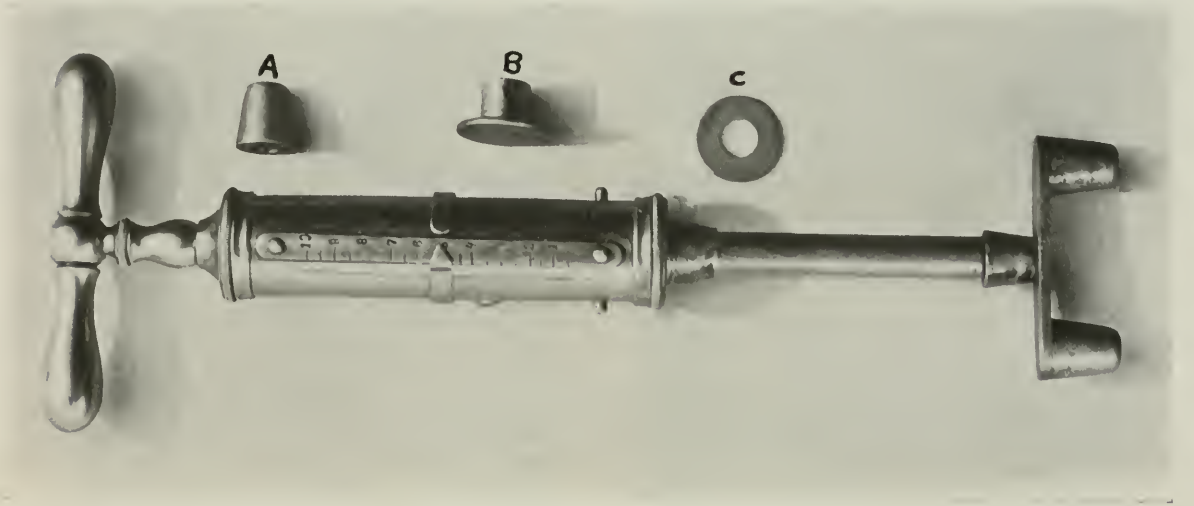
Many physicians have cured patients by the use of the latter method alone.

In *The British Medical Journal* [1] and in *La Presse Médicale* [2]

[1] July 8, 1911.

[2] October 4, 1911.

Fig. 4.

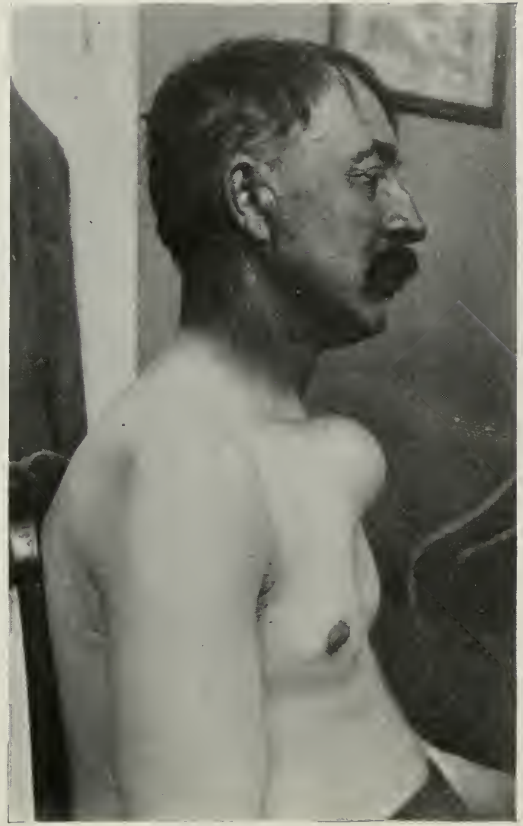


Spondyloreflexometer with attachments for bilateral paravertebral pressure. (*a*) attachment for determining the amount of pressure necessary to evoke vertebral tenderness; (*b*) attachment for algesimetric purposes; (*c*) ring used in conjunction with (*a*) to measure the resistance of spinal and abdominal muscles.

Fig. 6.

Patient of Dr. Atkinson, in whom results were attained only after treatment for one month.

Fig. 7.



Patient of Dr. L. St. John Hely, of Madera, Cal.

I reported forty cases in my own practice of thoracic and abdominal aneurism symptomatically cured within a few weeks by the concussion-treatment with absolutely no other adjuvant measure, not even rest.

The cases were all advanced, and there was absolutely no break in the continuity of results. Other physicians have reported in the journals and through correspondence equally good results.

Since then several cases have come under my observation in which the results were modified by complications. One case referred to me by Dr. Minaker, of San Francisco, died from chronic parenchymatous nephritis which existed at the time of consultation.

Up to the time of her death, however, the aneurismal symptoms did not recur.

The same was observed in a patient referred to me by Dr. W. C. Voorsanger, who at the time of consultation was sent by his physicians to this state on account of phthisis.

I saw in Lafayette, Ind., an advanced and practically moribund patient in consultation with Dr. A. C. Ackerman. The latter used my method with absolutely no result for about three weeks.

Prompted by my early achievements, I believed that a symptomatic cure could be attained in about two weeks.

Since then, in a case (Fig. 6) reported by Dr. Atkinson, of Los Angeles, results were not achieved for at least one month.

In a case (Fig. 7) reported by Dr. L. St. John Hely,[3] treated for about ten days, he wrote me, eighteen months later, that it was indeed marvellous that, after this period of time, the once moribund patient was without a single symptom. One week later he informed me that the patient had suddenly died from rupture of the aneurism while attempting to raise a heavy trunk.

In a discussion following an address before the Los Angeles County Medical Association[4] one of the disputants discussed a patient with an aneurism who was treated according to telegraphic instructions received from me. He hadn't any faith in the method, he argued, for the reason that, although the method was employed, the patient died three weeks later. I replied that the gentleman evidently had more faith in the methods of spondylotherapy than I.

[3] *Medical Record*, May 21, 1910.

[4] March 1, 1912.

I did not hope to resuscitate the dead, and if the patient had died three weeks later, he was practically moribund when treatment was commenced.

There is an aphorism, *"Naturam morborum curationes ostendunt,"* which is valuable in diagnostic therapeutics. If you have reason to suspect that certain symptoms are due to a supposititious aneurism, try concussion of the seventh cervical spine for about ten days, and if there is no amelioration you may reasonably exclude an aneurism.

Successful results thus far embrace aneurisms of the innominate, carotid, and thoracic and abdominal aorta. Respecting a diagnosis of an aneurism of the latter, the aortic reflexes are only of value if the colon is free from fecal accumulations. A descending colon will contract and dilate by stimulation of the same dorsal segments which provoke the aortic reflexes.

When you stimulate the vertebræ corresponding to the segments in question, you stimulate the spinal nerves located in these regions, for the contention of some physiologists is probably correct that there is no excitability of the spinal cord, and any stimulant effects must be referred to the roots of the spinal nerves.

Medicine

DISEASE SIMULATION *

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It must not be forgotten, especially if you are going to have much to do with patients suffering from nervous diseases, that disease simulation is not at all infrequent and that you will have to be constantly on your guard, particularly in hysterical patients, against deception by simulated symptoms. These are sometimes deliberately and consciously arranged by the patient, and sometimes there is an indeliberation about them or almost an unconsciousness, at least to the extent that patients deceive themselves as well as their physician if they can. I may say that these latter cases are the most difficult for even the careful diagnostician.

The history of medicine is full of such curious simulations. Until one hundred years ago it was not uncommon, in medical literature, to find accounts of various living creatures that had been vomited, such as live mice, and insects of all kinds, and even small snakes. It is rather easy to understand how much satisfaction hysterical patients must have derived from the acceptance of such declarations and deceptions on their part. Curious skin lesions are very frequently the result of simulation. Almost any physician of reasonably extensive practice will have had the experience of seeing a young woman apply strong carbolic acid surreptitiously to her arm and produce the most painful conditions. Skin specialists tell any number of such stories. Occasionally the lesions are merely erythematous, or discolorations, and in some reports the examination of the pigment has shown that it must have been applied from without and could not have developed from within.

In spite of the warning of such cases, every now and then the

* A lecture delivered at Fordham University School of Medicine.

physician finds himself taken in, and, indeed, the simulation is often so complete, the patient's story seems to involve so much pain and danger that it is almost impossible to think of simulation. In order to impress upon you, then, some of my own experiences which have shown me the extent to which patients may go in their simulation of symptoms, I am going to give you today the histories of a series of cases which to me represent about the limit to which such feigning on the part of patients can go.

While working in Virchow's laboratory in Berlin some fifteen years ago, one case of this sort in Professor Koenig's clinic attracted wide attention, and all the workers at the Charité Hospital had an opportunity of seeing Professor Koenig, one of the most distinguished of living surgeons at the time, the editor of a well-known text-book of surgery of international reputation, and especially noted as having paid more attention to appendicitis at this period than most of his German colleagues, misled for a while. The patient, a young man about twenty-five years of age, presented himself with some of the symptoms of appendicitis,—that is, he had, or claimed he had had, pain and tenderness in the right iliac fossa and considerable disturbance of pulse, although there was practically no temperature. He had, however, a distended tympanitic abdomen, which seemed to indicate that perhaps there had been a perforation of the appendix and that there already was an incipient generalized peritonitis. After admission to the hospital he complained loudly of exquisite tenderness all over the abdominal region, so that even the touch of the bedclothes produced torturing pain.

The most interesting feature of the case, however, was the presence of three scars of previous operations in the appendiceal region. He admitted that operations had been done for appendicitis before, but now the symptoms had developed again. The absence of temperature and, I think, the blood findings, though the differential leucocyte count was scarcely known at that time, caused some hesitancy about the operation until the history was secured. It was found that the patient had been in three other hospitals in Berlin. The appendix had been removed at the first operation, and the surgeons in subsequent operations had found no reason for the symptoms that had developed.

The previous history of the case was also interesting. The man

had been a soldier, as every young man must be in Germany, and during his first six months of service had suffered from a fall from his horse. No bones had been broken, but he had been very much shocked, and had subsequently developed a series of neurotic symptoms indicative of what is known as major hysteria. He lost his voice for a time, had complete anæsthesia and inability to use one of his limbs, and an hysterical palsy of one arm. After this he frequently developed trains of exaggerated symptoms, and while he was in the hospital he had on one occasion been near a patient suffering from appendicitis. As a consequence, not long after he had developed the whole train of symptoms apparently pointing to some disturbance in the region of the appendix. The first operator found nothing serious the matter, but thought it best to remove the appendix, since he had cut down upon it, and subsequent operators found nothing to do.

According to the story that was told at the time, Professor Koenig proceeded to have tattooed on the skin of the iliac region the words "No appendix here," and then allowed the patient to go. The symptoms all disappeared after a brisk purge and after the patient learned that the surgeon knew the history of his case. Here, then, was a patient quite ready to submit to a capital operation—in fact, getting up the symptoms that would lead to its performance, simply because this made him a centre of attention and satisfied a morbid craving for the notoriety and sympathy evoked by such an operation. Just how he succeeded in producing the distention of the abdomen is not certain, though you must not forget that a great many nervous patients have a gaspy habit of breathing during which they swallow a considerable quantity of air. This seems, indeed, to be the origin of a number of hysterical symptoms in the abdominal region, and it is probable that air is the cause of the discomfort that is so often complained of by these patients, though, of course, the pain they complain of is not present and is due entirely to a conscious or unconscious exaggeration, in which they indulge in order to attract the sympathy of their friends.

An even more surprising case of simulation of disease came under my notice the first day that I attended clinics in a foreign hospital. It was at La Pitié Hospital, in Paris. The patient had come into the hospital complaining of constipation and of some serious dis-

turbance of the abdominal organs. Examination showed the presence of a hard lump in the region of the liver of such great induration as to excite strong suspicion of a cancer nodule. It was deemed advisable to make an examination of the rectum because the patient complained of considerable disturbance there, and it was feared that some severe hæmorrhoidal condition, such as often occurs in connection with induration of the liver, might be developing in the lower bowel. Rather high up in the rectum an obstruction of some very hard material was met with, so that the resident physician referred the case to the visiting surgeon for examination.

When the patient was brought into the clinic, the induration in the region of the liver was pointed out and carefully examined, and the resident physician's suspicion as to its possible cancerous nature was confirmed. An examination of the rectum showed the presence of some foreign body, and the removal of this was attempted in the hope that it might throw some light on the other intra-abdominal conditions. After considerable difficulty this foreign body was removed. It proved to be the handle of a hoe, twenty-two inches in length and about the thickness of the ordinary American hoe handle, which the patient had thrust up into the rectum. I know that twenty-two inches seems rather large, but I saw the hoe measured, and then also the other end of it was felt as that hard nodule of great consistency in the region of the liver. Everyone will at once ask, but how did the upper end get past the splenic flexure so as to be felt over in the hepatic region? That is as much of a mystery to me as it is to you. Perhaps the splenic flexure is much more movable than we have been inclined to think; in this patient, at least, the large intestine seems to have been capable of being stretched around the hoe handle in a comparatively straight line from the rectum to the liver.

The patient was a man of sixty, of rather small stature and spare build. How he succeeded in inserting this hoe handle I cannot tell you. The suggestion was made that perhaps he had practised with it and gradually inserted it farther and farther with some idea of dilating the rectum in order to cure constipation, with which he had been bothered for years. He himself refused to say anything about it, although we understood that he afterwards confessed that some such idea of dilatation was in his mind. The constipation not improving he inserted the hoe farther and farther up for many days,

until finally one day it slipped away from him and he could no longer secure a hold on it; it then gradually worked its way somewhat farther up because of the movement of the muscles of the perineum and this region generally.

The surgeon was inclined to think that possibly there was another motive. Previous history showed that for ten years the man had been in the hospital very frequently, and that if possible he preferred to be there during the winter time. For one reason or another he used to get in, and it was rather difficult to get him out. A hospital record in various parts of Paris was discovered of admissions for petty accidents of various kinds, sprained wrists and ankles, and other minor affections, indigestion, obstinate constipation, biliousness or liver complaint, summer complaint, headache, and the like. During the first few days after admission there would always be a very poor appetite. He never seemed to care to eat the meals set before him, and, as a rule, he was careful not to empty the plates, but he was often found surreptitiously eating things which friends chanced to bring him so that he might remain in the hospital and yet not suffer too much from lack of food. This was a typical example of what has been called the "hospital bum," and on this occasion he furnished a very interesting example of how far a man may go in producing simulation of disease.

Of course, this insertion of foreign bodies into body cavities is not nearly so rare as might be thought. Children poke peas into the nose, or drop things into the ears, and whenever symptoms declare themselves in open cavities of the body careful examination should be made for such foreign bodies, which may produce serious complications. I have seen a condition of the nose in a farmer's child supposed to be a severe purulent catarrh due to the presence of a pea. Originally dry, it had absorbed moisture and had swollen to a considerable extent in the nostril. As can be readily understood, a rather serious condition soon ensued. I have seen a paper wad produce similar effects, and great care must be exercised to keep certain nervous children from doing such things.

Occasionally, however, adults, for one reason or another, may develop serious symptoms due to the insertion of various objects into bodily cavities or apertures. Very often sexual inclinations are connected with such conditions. The old-fashioned smooth-headed

hat pins are sometimes inserted in the male urethra, and occasionally are pushed in so far that they cannot be removed without surgical intervention. Under these circumstances, as a rule, it will not be necessary to cut down on them, but merely to push the point of the pin through the penile structures until it can be grasped firmly with a forceps, when it is pulled out as far as the head, and then, the pin pointing backward, the head is pushed out at the orifice of the urethra until it can be grasped and removed. With a little care this manipulation can be accomplished without any serious pain and without much loss of blood. It is comparatively simple and the patient is correspondingly grateful.

Sometimes more serious conditions develop, however, and considerable surgical intervention may be necessary. I recall very distinctly a case that I saw as a medical student in the service of Prof. J. William White, the well-known American surgeon, at the University of Pennsylvania. By means of the sound, as well as from the history of the patient, Prof. White had determined that there was a stone in the bladder, which he proceeded to crush and remove by litholapaxy. While making his soundings he noticed that the stone did not appear to give a very characteristic click, and just as he caught it between the blades of the lithotrite he declared that it did not feel at all like a stone. After some difficulty he succeeded in disentangling it from the blades of the instrument, and upon sternly demanding of the patient whether or not he knew of the possibility of something else besides a stone being present in his bladder, was told that there might be a piece of a tobacco pipe there.

Median lithotomy was then done, and the gutta-percha stem of a tobacco pipe was removed from the bladder. The patient confessed that he had inserted it into his urethra fastened to a straw as a sort of sexual perversion, and that on one occasion, having pushed it rather far in, the straw had broken off and then by some means or other, being unable to get it out, he had pushed it all the way into the bladder. A number of objects of the most curious nature have been found in the bladder, usually with some such story as this connected with them, though they are much more frequently found in the female than in the male. The male urethra is a long, winding canal from six to nine inches long, while the female urethra is short, straight, and only three-quarters to an inch-and-a-half long.

It is rather easy, therefore, for even objects of considerable size, marbles and the like, to be inserted into it, and small lead pencils and even hairpins have been found in it. There is no end to the curious perversions of mankind in this respect, and physicians must be prepared for the most astonishing discoveries unless they have been warned beforehand by the experience of others in such matters.

Foreign bodies find their way into the ear rather frequently, and often prove more of a source of disturbance than of danger. Some people become very much frightened if an insect finds its way into the ear, and would be quite willing to submit to the most extensive surgical operation. This dread seems to be connected with the idea that the ear is a passage to the brain, and that the insect may find its way into the brain. One otologist declares that the people who are most easily disturbed in this way usually seem to have so little brains that it could not possibly make very much difference even if the insect did get in. At least there would be plenty of room for it. Insects, of course, are best removed by simple syringing, and should not be probed for unless under full illumination and with proper instruments. Parents sometimes become very much disturbed if children are known to have put something into the ear. I was once told of a case where a farmer and his wife drove forty miles in a sleigh through deep snow to bring a child of about three years to a physician in order that he might remove a pea that it had put into its ear. While the doctor was getting his syringe and some warm water ready to displace the foreign body the little boy, crying, put his head down on his mother's lap, shaking his head mainly on the side on which the pea was, when out it rolled into the mother's apron. Perhaps this will impress on you the necessity to remember that such mechanical change of position is helpful in these cases.

Unconscious simulation of disease is particularly frequent in gynæcological affections. The old name hysteria, derived from the Greek word for uterus, indicates how much the Greeks thought of the genital organs in women as the cause of many neurotic symptoms to which the sex is liable and which undoubtedly become much more manifest during periods of uterine disturbance. The neurotic affections of the menstrual periods are particularly noteworthy, and many a woman has learned that symptoms that seem serious enough to her at that time are unimportant, because they constantly recur.

Very often for some hours at the beginning of the period before the appearance of the catamenial flow, they are much disturbed by these symptoms until something reminds them of the reason for the condition, and then the significance of the symptoms is recognized at once.

This is also true of the menopause, and most women who go through it are disturbed by all sorts of apparently serious symptoms, which they must be constantly reminded, are exaggerated by their irritable condition.

Pregnancy is not usually considered a disease, but it is illuminating in this matter of simulation to recall the fact that there may be complete feigning of practically all the symptoms of this important physiological process. We have even a nice long Greek name for the condition, pseudocyesis, though I much prefer our simple expression, false pregnancy. George Eliot once said, "We map out our ignorance in long Greek names," and I would advise you as far as possible to express what you have to say in simple words.

The number of physical effects that may follow upon simulated pregnancy are extremely interesting. The famous case of Queen Mary of England illustrates to what extent it may go. Anxious for an heir to the throne, Queen Mary was quite sure that she had become pregnant; her abdomen distended more and more, and the announcement was made at Court that a birth might be expected. Just what it is that causes the abdominal distention in these cases is not clearly understood. It disappears with the relaxation of tissues consequent upon the taking of an anæsthetic, so that it is probably due to some curious inflation of the intestines, or to some hypertension of tissues, very probably a vasomotor disturbance, that causes some extent of erectility owing to the concentration of attention.

Cases constantly occur in which women who have been exposed to the danger of becoming pregnant under conditions in which it would mean social disgrace, and as a consequence have grown nervous by worry, have produced in themselves a whole series of symptoms. The period is missed, they begin to feel uncomfortably full in the abdominal region, suffer from vomiting in the morning, and are quite sure that they must be pregnant. Under these circumstances, occasionally, they have recourse to the so-called female regulators,

that used to be advertised so commonly in our newspapers and that may yet be found announced in some even so-called respectable papers. Almost needless to say, their idea is that these regulators would produce an abortion, but I need scarcely tell you that abortifacients are not sold openly this way. As a matter of fact, we have no drug that will produce abortion with any assurance unless it produces such symptoms of poisoning as would endanger the life of the mother. Very often the effect of taking such a remedy is so strong upon the patient's mind as to undo the previous suggestion as to pregnancy, and then she is likely to have the consciousness almost of a crime committed. In such nervous persons, this may later prove a source of neurotic symptoms, and thus you see how many details the physician may be asked to know about his patients in order to understand their ailments.

Cases are on record in which these false pregnancies are even said to have brought about the secretion of lacteal fluid in the mammary glands. Such records are not well authenticated, but it is not improbable that this effect may be produced if a false pregnancy continued for many months. The breasts enlarge during the growth of certain tumors of the uterus, and the flow of milk is largely influenced at all times by the mind. All the other symptoms of pregnancy may be simulated. Peristaltic movements of the intestines may seem to signify fetal movements, and even the regular uterine contractions may apparently be simulated in the same way. Even the expert obstetrician and gynæcologist has been deceived for a time by the number and variety of the symptoms that seem to indicate pregnancy in these cases.

This surely should impress upon you what significant results may be produced by unconscious simulation of physical conditions. Here we have a question not of a pathological condition but of a physiological process, and yet the mind unconsciously produces effects in tissues that simulate very closely all the symptoms that have ever been suggested to the patient with regard to the condition. What an important rôle, then, suggestion plays in the production of symptoms of disease in susceptible people brooding over their ailments! This is particularly true with regard to women, and especially, in all that concerns affections of the genital tract and of such portions of the body as are reflexly connected with it.

Disease simulation is particularly likely to be noted with regard to affections of the gastro-intestinal tract. There are many forms of so-called neurotic indigestion, some of them with symptoms concentrated in the stomach, others diffused over the intestines, and yet the symptom-complex, dyspepsia, is much more likely to be associated with worrying conditions of mind in people who live indoors than in those who overeat but have much outdoor occupation. As an old English physician once said, "Much of the indigestion that I see is above the neck in origin." Undoubtedly many people by paying too much attention to their feelings in such a way as to disturb circulation may easily produce symptoms in the digestive organs. Whenever mental effort is concentrated on any set of structures there is likely to be a dilatation of the smaller blood-vessels, and a consequent oversensitiveness of the nerves in that region. This gives rise to a vague discomfort, especially in the upper portion of the abdominal region, and in people who have not very much to occupy their minds may produce what they call the tortures of indigestion or dyspepsia, especially if they are alone after meals; but if the mind is diverted by the presence of friends, or by a walk, or by some interesting occupation, such as a game of cards or of billiards, very little or no discomfort at all is felt.

It must not be forgotten that both the stomach and the intestines are rather thin-walled organs and are often sensitive to the weight of the food and drink taken at a reasonably large meal, and that, if the patient has nothing else to think about, the feelings of weight and distention may be brought above the threshold of consciousness. Thus, by concentrating the attention it is easy for such feelings to rise to the plane of rather severe discomfort. This is particularly true of nervous people, when, as it so often happens, only one large meal a day is taken, the morning meal being a hurried cup of coffee and a roll, lunch an apology for a meal, and dinner must constitute the main source of nutrition for the twenty-four hours. It is easy to understand that under these circumstances sufficient food must be taken at this meal to maintain strength, and this amount then produces discomfort.

The most important therapeutic agent in such cases is naturally to distribute the eating over three meals of the day, and thus avoid overloading the stomach at one of them. In this way, too, the appetite

can be better guided, and many food materials which are likely to be slow and difficult of digestion, particularly when mixed with a number of other substances, will not be taken in such profusion as would otherwise be the case.

In all of these vague disturbances of the gastro-intestinal tract the question of the unconscious simulation of disease in persons who live much indoors and whose mind has become centred on the digestive processes must not be forgotten. A great French physician once said, "I believe that the only really absolutely indigestible thing in the world is the human mind." When this gets on the stomach of a patient it is quite indigestible and is sure to interfere with the digestion of food materials in that viscus. The symptoms complained of often yield entirely to measures that bring diversion of mind. I have known many a business man extremely uncomfortable when he sat down and read his paper and perhaps went to sleep after dinner, and who believed himself a pitiable victim of indigestion, get prompt relief when he was induced to play billiards after a meal, or when his daily routine was changed so that he was not alone immediately after a meal. Diversion of mind during meals is important, but most important after meals. The old rules of the religious orders by which they were required to spend an hour, or very nearly that interval, after the two principal meals of the day, in conversation with each other, in what was frankly called recreation, is a tribute to the wise old monastic rulers and their recognition of this discovery of modern psychotherapy.

Occasionally it will be found that the beginning of the sense of discomfort may be traced to the lack of a sufficient quantity of fluid at meals. There is an old tradition that water taken at meals, by diluting the gastric juice retards digestion and overloads the stomach. Hawkes's experiments and observations in recent years, however, contradict this tradition, and show very clearly that when an abundance of water is taken at meals there is a marked increase both in the quantity of the gastric juice and in its hydrochloric acid content, and perhaps also in its fermentative power. Animals can fast longer with less loss of weight and strength if allowed an abundance of water. The forty-day fasters of a score of years ago always drank freely of water. This seems to indicate beyond all doubt that water promotes economical metabolism. A dry

diet is likely to be moved on less rapidly by the stomach and the intestines, and any delay in the progress of the gastro-intestinal contents is likely to be productive of discomfort. We have learned in recent years that gastric and intestinal motility are quite as important as the digestive secretions in these organs. Indeed, as regards the stomach, its motility seems to be more important than its chemism, and if its contents are promptly moved on digestion is not interfered with, even in cases of achylia gastrica, where there is no stomach secretion.

The whole question of discomfort as a symptom of disease of the abdominal cavity, and especially of the gastro-intestinal tract, needs careful review. It is an unconscious simulation of disease that has been the source of much worriment to patients and of many visits to physicians. Discomfort after meals is often only a question of concentration of attention on the process of digestion, or the more or less necessary discomfort in connection with the crowding of organs that takes place to some extent whenever people of relaxed fibre who do not take much exercise sit in a crouched position, or indeed, sit at all after meals. As soon as people can be persuaded to occupy themselves with something interesting after meals, as soon as the habit of attention to the digestion is overcome, the discomfort will disappear. Instincts are very precious guides in this matter, and it is well to realize that, instead of sitting down, men in a state of nature are apt to walk around after a meal. The story of the little boy on a visit to his grandmother who thought he could manage a second piece of pie "if he stood up" is important to remember in this respect.

These disease simulations are all significant because they often represent affections for which patients, unable to gain relief, get the habit of going from one physician to another, and finally fall into the hands of some irregular practitioner, who succeeds in occupying their attention instead of trying to cure their symptoms, and they then attribute the cure to his remedial measures, instead of to their own changed attitude of mind, which is the real curative agent.

PROTEIN SENSITIZATION AND ITS RELATION TO SERUM THERAPY

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If a small amount of egg-albumin is injected in a fresh guinea-pig no clinical phenomena occur, but, if, after the lapse of about ten days, a second injection is made, a violent reaction takes place, the animal dying within a few minutes with convulsions, dyspnœa, and hemorrhage into the internal organs. To this phenomenon the names anaphylaxis, hypersensitiveness, protein sensitization, and allergy have been applied. It was probably first observed by Jenner in the early part of the nineteenth century, although not understood at that time. As early as 1798 he observed that individuals who had had cowpox when inoculated with variolous matter reacted, contrary to his expectations, with fever and skin lesions of a pale red color, which passed away in a few days without producing variolous symptoms, such as occur in those who had not had the disease. It was also observed in the epidemic of the first quarter of the nineteenth century that those who had previously been vaccinated became ill with an eruption resembling smallpox, but which was much milder and soon passed away. To this illness Thompson, in 1820, applied the term varioloid.

In 1839 Magendie observed that rabbits injected with egg-white died following re-injection. Following the introduction of antitoxin an enormous amount of work was done along this line, as horse-serum, which is the vehicle by which the antitoxin of some infectious diseases is conveyed to the body, is capable of producing these symptoms in man. In 1902 Theobald Smith noticed that pigs which had been used as tests for diphtheria antitoxin died if later injected with normal horse-serum. Since that time Wolff-Eisner, Friedman and Isaac, Otto, Anderson and Rosenau, Vaughan and von Pirquet, and many others have made contributions on this important subject. Experimentally, the first step is the sensitizing of the animal. This

consists in introducing into its body by intravascular, intraperitoneal, or subcutaneous injection some foreign proteid.

In the guinea-pig, which has proved an ideal for carrying out these tests, in from eight to fourteen days the maximum intensity of sensitiveness is reached. This is the period of incubation, and the second step in the experiment can be carried out. Upon re-injection of the same proteid, after the lapse of this time, the symptoms of anaphylactic shock are produced.

The incubation time depends upon the amount of proteid introduced and upon the method by which it is given. Otto, Vaughan, and Wheeler found that after large doses the intravascular method of injection proved most effective.

The duration of sensitiveness varies, and in some cases may last several years.

In pigs the maximum sensitiveness occurs between the eighth and twentieth days. Following re-injection with the same proteid the following symptoms appear and do not vary much with the proteid used, but differ somewhat in the different species of animal injected: Death may occur almost instantly with dyspnœa and convulsions, or some time may elapse, during which the animal becomes restless and dyspnœic. Later, twitching of the muscles and convulsive movements occur, then retching, defecation, general convulsions, and failure of respiration.

Pfeiffer and Vaughan showed that there was usually marked depression of temperature, the fall varying with the severity of the shock. Leucopenia and loss of complement usually occur. Upon examination of the internal organs there is found complete distention of the lungs. The alveoli are greatly distended and the walls ruptured. The bronchi are contracted, due to contraction of the smooth muscle fibres (Hektoen).

Autopsies show invariably that the heart continued to beat for some time after respiration had ceased, which would seem to indicate that death results from a poison acting on the central nervous system, and particularly the nervous control of the respiration. In other organs multiple hemorrhages occur, particularly in the mucous membrane of the stomach, and fatty degeneration, which occurs in all acute toxæmias.

The earlier observers—Wolff-Eisner, Richet, von Pirquet, and

Weichardt—looked upon anaphylactic phenomena as an antibody reaction. It was explained by an extension of Pfeiffer's endotoxin hypothesis,—*i.e.*, that preformed toxins are contained in the introduced proteid and are liberated by the splitting up of the antigen by an antibody. Because of the small initial dose which was found to produce an anaphylactic state and the failure at times to produce it following large initial injections, and also the failure to find antibodies in the blood and body juices, the older views were replaced by theories of a cellular nature.

Anderson and Rosenau state that it is dogmatic to insist that the phenomena depend on the action of an antibody, but that the indications seem to be that we are dealing with such an agent. But since it has been shown that fresh pigs may be sensitized by the transfer of serum from sensitized animals, and that injections of mixtures of antibody and antigen might cause an immediate passive anaphylaxis, many investigators returned to the view that the phenomenon is an antibody reaction and purely of a chemical nature. The fact that offspring from an anaphylactic mother show a positive anaphylactic reaction, if tested within ten days of birth, is another indication that we are dealing with an antibody.

The question as to whether or not the sensitizing and toxic substances are of the same nature does not seem to be definitely settled. Vaughan is of the opinion that the reaction depends upon two substances, one of which produces immediate toxic symptoms and one of which sensitizes.

Anderson and Rosenau are of the opinion that the protein which sensitizes is the same one which later poisons the animal, although they found a slight difference between the sensitizing and toxic principles in horse-serum, so far as resistance to heat was concerned, but add that this may be more apparent than real because of the small amounts necessary to produce toxic symptoms.

Doerr and Russ found that heating affects both qualities of the serum equally. The majority of opinion seems to be that only one substance is concerned.

The toxic and anaphylactic properties of serum from an anaphylactic pig are both found in the globulin part of the serum upon fractional precipitation with ammonium-sulphate and not in the albumin content.

Von Pirquet and Shick found that in many instances sensitiveness diminished as the number of injections increased. This phenomenon, which has been termed antianaphylaxis and allergy, is analogous to immunity, and is explained on the basis of an absence of antibody. It has been observed also in some acute infectious diseases with reference to tuberculin reaction, particularly measles, diphtheria, scarlet fever, typhoid, and pneumonia. The cutaneous tuberculin reaction may disappear for some time, while there is no apparent change in the tuberculous process in the body. It has been found also that in measles there may be an insusceptibility to vaccination.

If an animal be made hypersensitive to a given proteid, the action has been found to be specific,—*i.e.*, horse-serum produces a sensitiveness only to horse-serum, egg-white only to egg-white, etc. This specificity explains why hay-fever subjects get relief from their symptoms frequently in a district in which the inhabitants suffer from the disease.

This subject gives us a different conception of what occurs in the body in infections, such as tuberculosis, diphtheria, typhoid, vaccinia, smallpox, hay-fever, and the idiosyncrasies shown toward some articles of food. The study of these phenomena has led von Pirquet, Wolff-Eisner, Vaughan, and others to abandon some of the older views with regard to the cause of symptoms of these diseases and to immunity. They have shown that the symptoms in these diseases are not always, as was formerly taught, due entirely to the direct action of micro-organisms and their products, and that the reaction of the body is not always favorable.

Vaughan explains the high mortality among the strong and robust from typhoid during the Spanish-American War as due to the capacity these individuals possessed of splitting up the typhoid germs and liberating a fatal amount of poison.

These experiments have shown that the incubation period is the time consumed by the body in manufacturing antibodies, and the symptoms are not produced until these combine with the infective agent and liberate toxin in sufficient quantity. Many proteid substances which are in themselves harmless become toxic when they combine or are split up by substances produced by the body itself. The latter have been identified as antibodies; special proteolytic

ferments. The conclusions have been applied with excellent results to tuberculosis, both diagnostically and therapeutically.

The patient responds to the tuberculin test because he already has a specific proteolytic ferment for the tubercle bacillus, which is the result of an infection at some former time. In vaccination against smallpox and typhoid, the immunity is not looked upon as an acquired insensibility to the virus, but as an antibody formation and a reaction as soon as the infection takes place. If an antibody still exists in the body from the previous infection or vaccination it immediately destroys the offending germ, following re-infection, with only a local reaction. If the antibody is no longer present, as might occur when a number of years intervene between the first and second infection, the body is still able to form antibodies in a much shorter time than it would be if the first infection had never taken place and the micro-organisms are destroyed before they have multiplied sufficiently to produce a large amount of toxin following the interaction with the antibody. To sum up briefly the generally accepted explanation of this phenomenon, we may say that when a foreign proteid is first injected into the body it must be disposed of in some way. This is done by the generation of a special proteolytic ferment which slowly digests the proteid.

As to the origin of this ferment there are differences of opinion. According to Metchnikoff, it is generated within the leucocytes, and ferments have been extracted from them. Ehrlich and Wright assign the function to all body-cells as taking part in the defence, while Sajous assigns it to the organs producing an internal secretion, particularly the thyroid, adrenals, and pancreas. They have this point in common, that a ferment is produced. This is probably stored up in the tissues as a zymogen, and when a second infection occurs the zymogen is activated and breaks up the protein with great rapidity, setting free the poison, thus endangering the life of the individual.

The discussion of what takes place during the process of sensitization and subsequent toxic poisoning is as yet almost entirely theoretical, but from these experiments and theories we can deduce some rules, which, if cautiously observed, will lessen the number of accidents following serum therapy, and particularly those fol-

lowing the treatment of diphtheria, which most of all has been fought against in some sections.

In serum therapy in man there are several factors which determine the occurrence of a reaction:

The susceptibility of the individual.

The toxicity of the serum, which varies in different horses.

The amount injected.

The age of the serum, fresh serum being more toxic.

There are in man two chief types of reaction:

Those following primary injection.

Those following secondary injection.

In those cases following a primary injection the incubation period varies from a few minutes to three weeks. The symptoms may be local or general. They are usually local, and manifest themselves earlier than those which are of a general character. In these instances, in which toxic symptoms follow the first injection, Vaughan thinks there already existed a special ferment for the serum. In the local reaction, redness, œdema, and urticarial wheals occur at the site of injection. There is usually some local itching, burning, or pain, and enlargement of adjacent lymph-glands. Occasionally there is slight fever and chilliness.

Following a primary injection an immediate general reaction is not of common occurrence, and such cases frequently prove quickly fatal, the patients dying within a few minutes after injection.

The most prominent general symptoms are fever, nausea and vomiting, skin eruptions of an urticarial or erythematous type, leukopenia, œdema, pain in the joints, swelling of the mucous membranes of the throat and larynx, enlargement and tenderness of the lymph-glands, extreme restlessness, dyspnœa, and occasionally failure of respiration, the heart continuing to beat some time longer. The majority of these symptoms are not constant, but occur in various combinations.

In the cases following secondary injection the symptoms may appear within a few hours and are typical of anaphylactic shock. Von Pirquet and Shick designated the early reaction as the immediate reaction, while that occurring from three to six days after secondary injection they designated the accelerated reaction.

The immediate reaction may be local or general. In the im-

mediate general reaction fever, skin reactions, intense itching, and swelling of the face may occur within 24 hours. In the accelerated reaction occurring five to seven days after the secondary injection the symptoms come on very quickly and are similar to those occurring after a primary injection. Both immediate and accelerated reactions may occur in the same individual.

The reactions following serum therapy are extremely menacing to both physician and patient, because they usually occur at a time when the patient is suffering from some other serious malady. People who are subject to asthma, hay-fever, and urticaria, and especially those who show an idiosyncrasy to the odor of horses, should receive a very small initial dose. In cases that are treated early, not more than .5 c.c. should be given as an initial dose. If no marked reactions occur more may then be given.

When injections are given often there is less chance for a hypersensibility to develop. Care should be taken not to introduce the serum directly into the circulation. If after these precautions a severe reaction should take place, treatment should be symptomatic and along lines indicated in shock and collapse in general.

The itching accompanying urticaria may be relieved by antipruritic lotions. For the swelling of the mucous membrane of the throat adrenalin may be used. Heart stimulants may be necessary, and since respiration usually fails before the heart, artificial means of maintaining it should be resorted to.

The occasional occurrence of unfavorable results should be explained before the serums are used, but they should not prejudice the physician against the value of serum therapy.

INTESTINAL AUTO-INTOXICATION *

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Intestinal auto-intoxication is a toxæmia produced by alterations in the digestive processes that are normally met with in the alimentary canal, such normal digestion including the products of activity of the enzymes of the stomach, pancreas, and intestinal mucosa, and more especially the products of activity of certain micro-organisms found in the tract. Like the digestive enzymes, micro-organisms convert starches into sugar, emulsify fats, hydrolyze proteins to proteoses, peptones, and amino acids. But they go further: whereas pepsin and trypsin, like acids, produce from the protein molecule, first, non-crystalline bodies, albumoses and peptones; second, ammonia; third, diamino acids, histidin, arginin, lysin; fourth, mono-amino acids (*a*) of the aromatic series, phenylalanin, tryptophan, tyrosin, (*b*) of the fatty series, glycocoll, alanin, leucin, glutamic acid, amido-valerianic acid, aspartic acid, micro-organisms like caustic alkalies produce from the same molecule, first, non-crystalline bodies, albumoses and peptones; second, ammonia; third, diamino acids, histidin, arginin, lysin; fourth, mono-amino acids, (*a*) of the aromatic series, phenylalanin, tryptophan, tyrosin, (*b*) of the fatty series, glycocoll, alanin, leucin, glutamic acid, amido-valerianic acid, aspartic acid; fifth, fatty compounds, butyric, caproic, and valerianic acids; sixth, aromatic compounds, para-oxyphenyl acetic acid, para-oxyphenyl propionic acid, phenol, paracresol, indol, skatol; seventh, marsh gas, carbon dioxide, sulphuretted hydrogen, methyl mercaptan.

It appears that the cells of the digestive mucosa reconstitute from the diamino and mono-amino acids new proteins which, when removed by the blood, serve to repair the organs; whilst protein entering the circulation without preliminary hydrolysis to the amino-acid form acts as a foreign body and is expelled through the urine.

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* Abstract of a paper read before the London Polyclinic.

Amino acids are, therefore, of much importance in nutrition; they can be completely oxidized in the body to urea, carbon dioxide and water.

Entirely different is the fate of the aromatic bodies produced by the putrefactive action of bacteria. They become excrementitious, incapable of oxidation to urea, carbon dioxide and water; and, while slightly toxic individually, they exercise when combined a deleterious influence on the organism.

Shultzenberger showed that ammonia is formed in the decomposition of the albuminous molecule whether the hydrolysis be effected by acids, enzymes, or bacteria. Salaskin demonstrated that the cells of the intestinal mucosa are much richer in ammonia in animals fed on meat than in animals fed on milk and carbohydrates; and Nencki and Pawlow have shown that this ammonia is converted into urea in the liver. Salkowski, Salaskin, and others have proved that leucin, glycocoll, and mono-amino acids generally pass over into urea in the liver through the stages of carbamic acid and carbamate of ammonia.

Leucin (amino-caproic acid) is changed in the liver into urea, and so thoroughly and continuously that when it is increased in the urine the diagnosis of hepatic insufficiency is complete. Leucin decomposes under the agency of bacteria into volatile fatty acids, acetic, butyric, valerianic, etc. When oxidation of ammonia fails toxæmia occurs. Ammonia has been shown experimentally to possess a coefficient of toxicity forty times that of urea.

Tyrosin (oxyphenylamino-propionic acid), an aromatic nucleus of the protein molecule, is hydrolyzed by bacteria into phenols and cresols; and an allied nucleus tryptophan (indolamino-propionic acid) is decomposed into indol and skatol. In vegetable proteins phenylamino-propionic acid—phenylalanin—separates out and is oxidized into benzoic acid, or unites in the kidneys and liver with glycocoll to form hippuric acid.

Lastly, microbic putrefaction of proteins includes toxic bodies known as leucomaines and ptomaines. In the presence of sufficient oxygen and normal tissues the poisonous end products above mentioned are oxidized to simpler and much less harmful forms.

By careful application of Gram's stain it is possible to roughly divide the bacteria of the feces into two groups. On blood agar

plates the dominant bacteria of any segment of the tract can be readily demonstrated. In the stools of a breast-fed infant the slender slightly curved (Gram-positive) *B. bifidus* of Tissier predominates to such a degree that the microscopic field in a stained specimen appears often as a pure culture of one type. These organisms inhabit the cæcum and colon. The bacteria of the small intestine of such a child are Gram-negative short rods corresponding with *B. coli* and *B. lactis aërogenes.* As the ileum passes into the cæcum the coli forms give place to the bifidus. In the stools of bottle-fed infants the dominant organisms are of the coli (Gram-negative) type. The number of bacterial forms, moreover, in these cases is greater than in breast-fed children; especially are the facultative and obligate anaërobes more numerous.

In adults of 50 years of age and upward leading sedentary lives, plating on blood agar yields *B. aërogenes capsulatus* and *B. putrificus. B. coli* may be well represented or otherwise. The ratio of ethereal to preformed sulphates in the urine of these cases is considerably increased.

In old age, which is determined by the physiological potentialities of the body cells rather than by years, distinct diminution is observed in the number of organisms of the *B. coli* type. The appearance of the microscopic fields and the degree of gas production in fermentation tubes have entirely changed. Putrefactive processes are now thoroughly in evidence. The carriage of undigested proteins into the colon where *B. aërogenes capsulatus* and *B. putrificus* abound results in increased putrefactive decomposition. It is now certain that in some cases of so-called ptomaine poisoning the matters in fault are the alimentary bacteria rather than foodstuffs.

Phenol is formed only in the large intestine. Indol is formed before phenol and in the lowest portions of the small intestine. The quantity of indol produced in the gut is proportional to the amount of albumin ingested; it is increased by a meat diet and diminished by a vegetable diet. It is largely increased where the quantity of meat eaten is in excess of the digestive powers, where the amino acids are not fully assimilated, and where there is stagnation of the contents of the small intestine. Progressive indicanuria points to intestinal occlusion at a time when clinical symptoms have not yet

appeared. Skatol is a methyl-indol derived from tryptophan, and increases and decreases in parallel with indol.

The phenols (phenol and paracresol) are formed by bacterial putrefaction from tyrosin. This body splits into para-oxyphenyl-acetic acid and para-oxyphenyl propionic acid, which in turn are converted into phenol and paracresol. The putrefactive cleavage of tyrosin occurs in the large intestine only, and phenols are found in considerable quantities wherever stasis of the large intestine exists. If the quantity of phenols formed is within the oxidizing powers of the organism these bodies will not appear in the urine. The quantity of phenols produced is not the important fact related to auto-intoxication, but rather the quantity that fails to be oxidized and that is subsequently excreted, for that only circulates in the blood to the damage of the organism. It may be noted that outside the large bowel phenols are frequently produced in empyemas, ulcerating carcinomas, and tubercular cavities.

In order to limit and diminish intestinal putrefaction, it is obviously necessary to limit nitrogenous articles of diet, such as meats, fish, eggs, etc., and all the more necessary if these substances are not fresh. Substitution in the dietary of large proportions of milk, fresh cheese, and farinaceous foods greatly decreases the products of putrefaction. It is further necessary to promote the rapid absorption of the products of protein digestion as they are formed and before they become the victims of intestinal bacteria. Water is not absorbed in the stomach. Gastric absorption varies according to the degree of concentration of the dissolved bodies. Brandt showed that in a normal stomach the maximum absorption power is obtained with a concentration of 20 per cent., and that when the concentration fell below 5 per cent. absorption ceased. Dry meals favor absorption and lessen, accordingly, putrefaction.

If the hydrochloric acid of the gastric juice fails to destroy all the bacteria ingested, it diminishes their number, inhibits their growth, and attenuates their virulence. Insufficiency of gastric juice is, therefore, an important cause of putrefaction. The bile acids, especially taurocholic acid, exercise an important antitoxic action. Jaundice is often accompanied by considerable putrefaction. The acid reaction of the normal small intestine is undoubtedly the most important factor in protecting the derivatives of protein from

the action of the proteolytic anaërobic bacteria. Herein lies the importance of the rôle played by the normal flora of this portion of the tract, such as *B. coli, B. lactis aërogenes,* etc.

In the healthy colon and appendix very few, if any, strict anaërobes are found. In the pathological colon and appendix aërobes disappear and anaërobes predominate.

Foods may be well selected, but taken in too large quantities, with the result that a residue is left, which undergoes putrefaction. A normal quantity of food may be used, but badly selected when the digestive juices fail to produce the necessary changes. Failure of the digestive juices, however, is much more often a result of auto-intoxication than a cause of it. Gastric and intestinal stasis, muco-membranous enteritis, chronic appendicitis, intestinal parasites, and purulent matters from the throat and nose swallowed during sleep when the empty stomach contains no hydrochloric acid, all contribute to the production of this malady.

Against intestinal toxins the body possesses three main lines of defence, viz., (1) the intestinal mucosa, (2) the liver, and (3) the glands producing internal secretions—thyroid, pituitary, and supra-renals.

Kutscher has shown that the cells of the intestinal mucosa absorb the di-amino and mono-amino acids, and synthesize them into living protein; the normal execution of this function deprives the putrefactive bacteria of the material in which they produce toxins. Charrin showed that various toxins lost their toxicity when introduced into the body by the alimentary tract. Using through the circulation a fatal dose of filtered bacterial toxins, he demonstrated that fifty times this dose of the same toxins was without effect when introduced through the alimentary canal. The neutralization of toxins was not produced by the gastric or intestinal juice, as the results were the same after preliminary alkalization of the stomach contents and after direct injection into the ileum. When the intestinal mucosa is curetted or altered by heat or drugs, the same dose of toxins becomes rapidly fatal. These cells perform the functions of gland cells such as those of the liver: they act as dialyzers in retaining the colloid matters, and, further, attenuate the toxic action of proteins, while they permit without change the passage of salts and ammonias. It must now be admitted that the intestinal mucosa,

apart from its passive rôle as a filter, exerts a true antitoxic function. If, then, it become inflamed, degenerated, or atrophied, the insufficiency of antitoxic action thereby engendered allows such an increase of toxic bodies to pass as will produce auto-intoxication with all its grave consequences.

One of the most important functions of the liver is to extract from the portal circulation toxic bodies which have escaped the intestinal mucosa. By transforming the highly toxic ammonia and the slightly toxic amino-acids into urea, the liver diminishes enormously the toxicity of the portal circulation, as it requires at least 6 grammes per kilo. of urea to kill most animals.

Whilst uric acid is but very slightly toxic, the nucleins and xanthin or purin bases from which it is formed are distinctly toxic. In this transformation a hydrolytic ferment converts guanin and adenin into xanthin and hypoxanthin, and an oxidase (xanthino-oxidase) changes hypoxanthin into xanthi, and xanthin into uric acid. Gautier included the purin bases in his list of leucomaines. Bouchard considers that the liver reduces the toxicity of the bodies passing to the kidneys for elimination by at least 75 per cent. The work of Pflüger has demonstrated conclusively that the toxic aromatic radicles become innocuous in the liver through their combination there with sulphuric and glycuronic acids. The fresh pulp of the liver holds phenol and cresol so tenaciously that these bodies cannot be recovered by distillation. How exactly the zymases secreted by the liver cells act we do not yet know, but it remains that, in all cases where the liver anatomically or pathologically is unable to properly neutralize organic poisons circulating in the portal blood a hypertoxic urine appears.

Several years ago it was noted that carnivorous animals suffered greatly from lesions of the thyroid gland, while herbivora suffered but little. More recently, dogs upon whom thyroidectomy had been performed have been fed with different foodstuffs, and it has been found that milk, boiled meat, and bromated fats prolong life for a time, while beef-tea and roast meats induce violent convulsions and rapid death. The salts of the beef-tea, when added to the milk, produce no effects, from which it is inferred that the toxic bodies are the kreatinic leucomaines of the meat extract.

Varying grades of insufficiency of the thyroid result in corre-

sponding degrees of myxœdema, and insufficiency of the parathyroids results in tetany.

The colloidal secretion of the anterior portion of the pituitary is of the same nature as that of the thyroid, and there is good reason to believe that the physiological action of this substance supplements that of the thyroid.

Experimental evidence has abundantly proved that the internal secretion of the suprarenals exercises at the same time nutritive, vasomotor, and antitoxic functions.

Salts of potassium, bromine, and iodine, and sometimes leucin, xanthin, and urea, are eliminated in the saliva.

After the kidneys the skin is the most important organ of elimination of toxic compounds. Urea, ammonia, kreatinin, cholesterin, and various volatile fatty acids are discharged in the sweat. Cramer estimates that 12 per cent. of the total excretory nitrogen may leave the body by the skin. Children, the subjects of intestinal auto-intoxication, perspire freely and suffer from acneiform and pruriginous eruptions.

Sulpho-ethers, phenols, skatol, and the aromatic oxy-acids are present in sweat, and Kast has found Baumann's toxic coefficient for sweat to be as high as that of the urine in the same individual.

The kidneys secrete the aromatic bodies (1) as conjugated organic salts of sulphuric and glycuronic acids, (2) as aromatic oxy-acids, and (3) as leucomaines and enterotoxins. Any insufficiency of the kidneys must lead to retention of the products of protein putrefaction and hence autointoxication.

The stools consist of the undigested alimentary residues and products of secretion of the intestinal and neighboring glands, all of which have been subjected to the action of anaërobic putrefactive bacteria. The products of nitrogenous putrefaction are usually in much greater proportion than in the urine. This is due to their excretion by the stools and to the changes they undergo in the intestinal mucosa, liver, and antitoxic glands. There is accordingly no relation between the proportion of aromatic bodies in the intestine and the proportion of the same bodies in the urine. Putrid and fetid stools may be accompanied by urine comparatively free from products of putrefaction. Again, apparently normal stools may give rise to auto-intoxication owing to failure of the lines of defence. In

this work examinations of the urine must ever go hand in hand with examinations of the fæces.

It may be concluded, then, that protein putrefaction depends on the composition, abundance, and frequency of meals, nitrogenous residues of which are left as a prey to the anaërobic bacteria in the lower portion of the alimentary tract; on the quantity of liquid ingested; on the number of anaërobic proteolytic bacteria present in the large bowel; on the absorptive powers of the mucosa; on the frequency of the stools—toxic substances being most rapidly eliminated in diarrhœic stools; and, lastly, on the degree of sufficiency of the antitoxic mechanisms of the body.

A BRIEF SUMMARY OF BENCE-JONES PROTEINURIA.

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I. NATURE OF THE BODY

Among the less frequent urinary anomalies there is none which is more interesting in its various relations than Bence-Jones proteinuria. This phenomenon was first noted by the English chemist, Bence-Jones, in 1846, and by him described as albumosuria. It was not until thirty-seven years later that a second case was reported by Kühne, who likewise considered the body excreted in the urine an albumose. This view of its chemical nature prevailed until recent times, when the application of more modern methods has shown it to be a true protein, related to the blood proteins, yielding primary proteose (albumose) on digestion, and the characteristic amino-acids after hydrolysis. In view of these facts, the title Bence-Jones albumosuria is a misnomer and should be abandoned. In the twenty years following Kühne's report, about thirty-five additional cases appeared in the literature, while in the last decade the number has increased to over a hundred.

II. OCCURRENCE

An analysis of these cases reveals the striking fact that in every instance in which the studies were complete the excretion of this protein was associated with disease or injury of the bone-marrow. By far the greater number have been examples of a comparatively rare type of sarcoma primary in the marrow, known as multiple myeloma, including the earlier cases erroneously described as osteomalacia. It has also occurred very infrequently in association with other types of bone-marrow disease, notably chronic lymphatic

leukæmia (4 cases), carcinomatous metastases to the bones (2 cases), senile osteomalacia, and gunshot wound of the leg. In addition, there is a more indefinite group including a variety of conditions other than myelomatosis, which may be divided into three general classes: (1) Certain instances have been reported with history and clinical picture suggesting involvement of the bone-marrow, the nature of which was not determined, as autopsies could not be secured. (2) Again, the Bence-Jones body has been discovered in the urine of individuals in whom no evidence whatever of involvement of the bone-marrow was observed during life. We know, however, that typical cases of myelomatosis may exhibit the characteristic proteinuria long before the appearance of signs or symptoms referable to the skeleton, hence, in the absence of a pathological examination, such a finding does not exclude the existence of bone-marrow disease. (3) Finally, a few cases which are complete from the clinical and pathological standpoint must be disregarded, as the chemical evidence given is insufficient to establish clearly the identity of the protein found with the Bence-Jones body.

The experimental side of this problem has received but little attention. The excretion of the Bence-Jones protein has, however, been produced in dogs by the injection of pyrodin, which causes a severe anæmia and an extensive hyperplasia of the bone-marrow. On the other hand, in the aplastic anæmia following benzol injections no such results were obtained.

It is to be noted, moreover, that well-established cases of myelomatosis have occurred in which the Bence-Jones protein was absent during the entire course of the malady. Also, many instances of extensive and varied bone-marrow involvement have been carefully studied without the discovery of this peculiar protein in the urine. These include primary and metastatic tumors, leukæmias, anæmias, infections, and injuries.

III. GENERAL CHARACTER OF THE URINE

In the typical cases of myelomatosis the proteinuria may antedate considerably the development of bone symptoms as noted above and may be intermittent. Ordinarily there is a polyuria of two to three litres per day, the urine having a normal specific gravity

and showing a great tendency to foam on shaking and to become darker on long standing. For the most part, the Bence-Jones body is the only protein excreted, serum albumin being rarely found. Casts are sometimes present, but more frequently absent. In those instances in which the chlorides have been quantitatively determined the output has been markedly decreased.

The amount of the Bence-Jones protein excreted may vary considerably in different cases and from time to time in the same case, but is for the most part strikingly large, occasionally fifty to seventy grammes in twenty-four hours. In contrast, it is interesting to note that in the cases other than multiple myeloma much smaller quantities are excreted,—from a trace to a maximum of 2 grammes per day. Another interesting peculiarity occasionally observed is the spontaneous precipitation of the Bence-Jones protein. This may occur before the urine is voided, giving it a milky appearance, or after standing a longer or shorter period, from a few hours to several months. On the other hand, specimens have been kept for years without any such precipitation. When they occur, these precipitates are of a pinkish or yellowish-brown color and of a rather gelatinous consistency.

IV. DETECTION OF THE PROTEIN

The recognition of this body is simple. Owing to the fact, however, that it responds to most of the common tests for albumin, it may be readily overlooked. Nevertheless, the differences in the reactions are sufficient to attract attention if a little care is exercised in the course of an ordinary routine examination, and the identity of the body may be determined by a few characteristic tests. The most striking of these is the precipitation on heating the urine slightly acidified with 5 per cent. acetic acid at a temperature of 50° to 60° C. and its partial or complete resolution on boiling with reprecipitation on cooling.*

* The completeness of the solubility of the Bence-Jones protein at the boiling point depends largely upon the reaction of the urine and the nature and concentration of the salts present, consequently varying in rather wide limits. The blood proteins, albumin and globulin, which are present in the urine of nephritis begin to precipitate at or above 70° C., and are quite insoluble in boiling urine. Partial resolution at the boiling point may be detected by filtration of the hot urine when a turbidity develops on cooling the clear filtrate.

The layer test with cold nitric acid gives a white ring at the contact line indistinguishable in appearance from that given by serum albumin. Dilute nitric acid (25 per cent.) gives a precipitate in the cold, which disappears more or less completely on boiling, to reappear on cooling. The reaction with potassium ferrocyanide and acetic acid is not distinctive except that it is apt to be delayed and to require an excess of acid. When this test is used as the routine for albumin, Bence-Jones protein is almost sure to be overlooked. With two volumes of saturated ammonium-sulphate solution there is complete precipitation at room temperature, which precipitate is entirely soluble in water. It also goes into solution on dialysis and does not pass through the dialyzing membrane, differing in this respect from albumose (proteose). The dialyzed solution gives the characteristic tests as above. The precipitate obtained by heat and acetic acid at 60° C. may also be brought into solution by warming with dilute sodium carbonate, and, after dialysis to remove the sodium carbonate, will then yield the precipitation tests.

The presence of the Bence-Jones body should be suspected in any urine which, when treated by the heat and acetic method, becomes turbid well below the boiling point, especially if the turbidity shows a tendency to decrease when the boiling point is reached and to reappear on cooling. As corollary to the foregoing it is obvious that in the routine examination for albumin the preference should be given to the heat and acetic acid method, and that the heat should be applied slowly. It is perhaps unnecessary to say that the urine should be filtered until clear before any test for protein is made. Other tests for Bence-Jones body as it occurs in the urine and when isolated in the pure state may be found on reference to the table in Neuberg, *Der Harn,* 1911, i, 774. If serum albumin is also present, it may be determined by first heating the acidified urine to 60° C. for one hour, cooling, filtering until perfectly clear, and boiling the filtrate.

V. THEORETICAL CONSIDERATIONS

Various hypotheses have been advanced to explain the occurrence of this peculiar protein in the urine. These fall naturally into several groups. Some have sought its derivation directly from

the tumor itself—either as a secretory product or as a result of the disintegration of the tumor cells. This position would seem untenable for several reasons: First, there is no convincing chemical proof of the presence of the Bence-Jones protein in the affected marrow. Second, the amount of the protein excreted bears no quantitative relation to the bulk of the involved marrow, and in the multiple myeloma cases may in twenty-four hours exceed the entire weight of tumor tissue. Third, the excretion may be very abundant before any changes in the marrow are clinically detected even by X-ray, and disappear in the later stages of the malady when the involvement is most extensive. Others have explained the phenomenon as due to the influence of the tumor upon metabolism, either exogenous or endogenous. Some have suggested its origin in a misdirected or incomplete synthesis from the cleavage products of the food proteins in the intestinal wall. Careful metabolic experiments, however, have shown that the amount of the Bence-Jones body excreted is largely independent of the amount and kind of protein ingested, which renders this explanation inadequate. In relation to endogenous metabolism, those writers who considered the body an albumose (proteose) very naturally sought its origin from the proteins of the blood. The study of the cleavage products of the Bence-Jones body shows conclusively that it is not an albumose and that its proportional composition is such as to make its origin from the blood proteins most improbable. This leaves us with the possibility of its derivation as an intermediary catabolic product of the more complex tissue proteins. The evidence at hand is as yet insufficient to permit of an absolute statement, but whatever the metabolic process involved, we must assume that the pathological condition of the bone-marrow is the determining factor. This effect on metabolism may be produced either by some abnormal product of the diseased tissue or through the loss of some substance normally contributed by the bone-marrow.

VI. SUMMARY

The assumption that Bence-Jones proteinuria is an exceedingly rare phenomenon has undoubtedly made us less alert in its recognition. The fact that 60 per cent. of the cases have been reported in the last ten years indicates that its incidence is greater than

previously assumed. It is certain that if all the urines yielding a protein test were carefully examined by heat and acetic acid, the number of cases recognized would be largely increased, especially such as are due to causes other than myelomatosis.

The detection of this protein is not of merely academic interest when we consider its importance from a diagnostic standpoint. It is not too much to say that it has a much more definite significance than many of the more commonly encountered pathological constituents of the urine. The accumulated evidence justifies the assumption that Bence-Jones proteinuria means bone-marrow disease. Furthermore, if the body be present in considerable quantity, the disease is almost certainly multiple myeloma.

Negative findings, on the other hand, have no such definite significance, as the absence of this body does not exclude the existence of extensive involvement of the marrow.

Important also are the prognostic aspects of this phenomenon, for it is noteworthy that almost without exception the cases have terminated fatally within two years after recognition.*

* To such as desire to read the subject more extensively we would suggest the following papers:

[1] Magnus-Levy, *Zeit. f. Phys. Chem.*, 1900, xxx, 200.

[2] Abderhalden and Rostoski, *Zeit. f. phys. Chem.*, 1905, xlvi, 125.

[3] Hopkins and Savory, *Jour. of Physiol.*, 1911, xlii, 189.

[4] Rosenbloom, *Biochemical Bulletin*, 1911, i, 161.

[5] Boggs and Guthrie, *Am. Jour. Med. Sci.*, 1912, cxliv, 803; *Johns Hopkins Hosp. Bull.*, 1912, xxiii, 353.

IS THE CAUCASIAN RACE DETERIORATING?

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If it is true that among wild animals stability is maintained only by wholesale elimination of those who fall more than a little below the average of the particular species concerned, it follows that in the human family instability will result from relaxations of the process of natural selection, many of which are now in evidence among civilized peoples. Among the variations which are noticeable, and which will probably continue to appear and to survive, are many of a distinctly retrogressive character, such as loss, partial or complete, of powers and faculties which were formerly essential to the existence of the individual possessing them.

Whether degeneration, slow or rapid, is actually taking place among civilized nations, is not easily determined. Those who assert that it is not, have many arguments to support their view, but there is no certainty that those arguments are sound. Most optimists point to the striking phenomenon of the increased stature of women, not a mere fraction of inches ascertained by careful measurements, but an obvious fact, visible to any person who is capable of observation. There is, in addition, the constant advance in athletic records. Again, mining prospectors in Alaska and South America are able to undergo hardships as well as any of their predecessors, while United States soldiers cannot be said to be markedly inferior to those of Japan in any respect. The athletic tendency of to-day must, it is maintained, lead to an improvement in physique. Moreover, longevity, according to some investigators, is increasing, and finally, as to diseases, many that are fatal to savages are not very serious when they attack civilized men.

However, there is much to be said on the other side. No breeder of horses would hope for good results if he were to use for breeding purposes the best and the worst indiscriminately. No practical breeder is so neo-lamarckian as to believe that any process of training could do much to mitigate the bad results that would follow

from such a system. The question of stature presents many complications, and unjustifiable conclusions may fairly be said to be drawn from the evidence by some enthusiastic observers. As to athletic records, they are partly due to skill, not solely to physique. In addition, more young men devote themselves to athletics than was the case in former times, when many who had athletic capacity neglected it; and even now a large proportion of the population is untouched by the athletic movement. They shout and cheer, but do not enter the arena, because they realize their inability to rise to distinction.

There still remains the question whether any race improvement would result from the improvement of the individual due to better conditions of life. As to soldiers, the commissariat is much better managed than it was during the civil war, and great as are the hardships that military men are compelled to suffer, yet, compared with conditions fifty years ago, fighting is almost luxurious. The same arguments may be applied to mining prospectors. They know how to live in the regions in which they work, and they take some of the appliances of civilization with them. Moreover, mining prospectors, and to a less extent soldiers, are picked men.

The enthusiasts who believe that the human family is improving say very little about such matters as teeth and eyesight. It is admitted by all, except the most irrational optimists, that the teeth and the eye of civilized man have degenerated. With regard to longevity, the figures require careful analysis. The increased average length of life is due mainly to the survival of many infants who can hardly be expected to become vigorous men and women, or to the sheltering from the risks and hardships of active life of persons who have lost all vigor. In their contention with regard to disease the optimists have a very strong case. Civilized man is undoubtedly able to withstand many diseases which prove fatal to savages. But is it at all certain that this power will remain now that medical science is advancing with a rapidity unknown till recent times, which shields him from enemies against which formerly his own strength of constitution was the only defence? Natural selection still secures as its victims a large proportion of all persons born, and from this it might be argued that improvement in the conditions of life has not yet gone far enough to involve any danger—that civilization has

only reduced the percentage of the population eliminated in a very minor degree, possibly ten per cent. in fifty years. With the improvement of the environment, however, which reduces the amount of elimination, there follows a deterioration of physique caused by the cessation of selection—what Weismann calls panmixia. Consequently, however easy life may be made, so long as the process is gradual, there will not be any phenomenal decrease in the death-rate. It is not the improvement in the conditions of life, but the change in them, the change from hard to easy, that produces the reduction in the death-rate.

Turning to the question of stature—it was a fixed belief of many early peoples that their ancestors were bigger and stronger than themselves. Modern theorists do not accept this idea; instead of so doing, they look for facts, and of these there is a scarcity. It seldom happens that average representatives are measured. Those whose height is usually recorded are picked men, such as soldiers or college students, who are proud of their stature, or their strength. But even if we had an ample supply of facts, the interpretation of them would be very difficult. There appears to be reliable evidence that the Neolithic men who lived in what is now France were a trifle less than five feet four inches in height, and the average height of the Frenchman of the middle ages was a little over five feet five inches. The Neolithic men were, it appears, very far from the giant class. But even these measurements throw little light on our subject, because the representatives of the different periods do not represent one and the same people. Successive waves of migration swept over western Europe, and each modified the existing physical type. The figures given above merely disprove the impression, if it still survives, that all pre-historic men, were of immense stature. Inspection of suits of armor in the Tower of London (England) indicates that the wearers were neither dwarfs nor giants, although one suit was evidently made for a man of great stature and bulk. King Henry VIII (of England) is believed to have been a very big man, and this may have been his armor. The collection of armor in the Tower suggests that height three or four centuries ago was much as it is to-day. But we must not lose sight of a very important fact, viz.: that a marked distinction must always be drawn between the physique of the race and the actual physique

attained by the individuals who represent it. The germ-plasm, as Weismann has shown, leads to a great extent a life apart from the soma. The line of descent in a family is thus largely independent of the representatives of the family. The line is like a string of beads, and an individual is a pendant from one of them. It may to some minds be difficult to believe that the health of the whole organism has no influence upon the reproductive cells, but Nature, intent upon the continuation of the species, seems not to allow them to share the full sufferings of the individual who is the trustee and guardian of the race. Their vigor remains even after the soma has been weakened and impoverished. It is necessary, therefore, carefully to define the word "degeneration" when we speak of the degradation of the slum-dwellers of our large cities. It is the degradation of the individuals and not of the race. That this is no fanciful distinction is shown by the fact that the Jews have emerged from the squalid life of the Ghetto in many ways stronger and with greater vitality than the peoples among whom they lived. It is, indeed, the Ghetto life to which the Hebrews owe their remarkable vitality. In the Ghetto none except the strong could survive, and transmit their characteristics.[1] To apply this truth to the subject under discussion, we must recognize that there is for each individual a potential and an actual strength. The stature of the race is the potential stature of the individuals who compose it, and if a bad environment dwarfs a particular generation, the next generation may, nevertheless, attain to the full development.

In the light of this distinction, it seems most probable that the increased height of women at the present day is due to more favorable conditions, such as fresh air and exercise, and all that helps to make the most of the individual's physiological capital. There is reason to look in this direction for the explanation rather than to regard it as definitely a race improvement. When a species attains to a higher standard of excellence, the cause at work is increased stringency of elimination of those individuals who possessed con-

[1] This expression refers to congenital characteristics—germinal variations—only. After many years of study and investigation, the writer has been unable to discover any reliable evidence of the transmission of any strictly acquired character. The transmission of syphilis is an infection of the germ, and does not constitute true heredity.

genital characteristics which were unfavorable to their survival. But there is no reason to suppose that anything of this kind has occurred in the matter of female height, for short women, except dwarfs, have as good a chance of living as tall women. Again, increased height does not always mean increased vigor. Every army officer knows that stature is no proof of stamina. In addition, tallness is a relative term. A tall Japanese would not, as a rule, be a tall American. Finally, great height may be a symptom of degeneracy; it may result from the easing of the conditions of life which allows weakness in various forms to survive.

It is beyond dispute that as change of conditions gradually makes certain characters and qualities possessed by animals unnecessary to their survival, or necessary only in a reduced state, those characters and qualities will tend to dwindle. The fish in the Kentucky caves have become blind; the apteryx has only vestiges of wings; the barnacle has lost its eyes and its power of motion; the *plica semilunaris* of the human eye no longer protects that organ from the light of the sun. In a universe where adaptation is the rule, it is most improbable that there can be any great and inexplicable exception to that rule. As natural selection is still at work, even among the most civilized peoples, it is more reasonable to attribute their strength to the cosmic process than to assert that they have by some unknown method become, or have made themselves, superior to the laws which prevail throughout the rest of the organic world. It seems, therefore, as if in time man will lose qualities with which he can dispense. We may feel sure, however, that those qualities which are essential to general efficiency will die harder than those which, in their perfection at least, have become mere luxuries. The former can at the most rapid rate degenerate only at a pace proportionate to the general easing of the environment; the latter may have a velocity of their own, for they have ceased to rank as qualities of first-class importance. For example, a man whose head is devoid of hair at thirty-five years of age, whose eyes are markedly myopic and astigmatic, and whose teeth consist chiefly of gold fillings may be very vigorous and efficient under modern conditions.

The permanence of race-characters demands consideration. These are the characters which are maintained by the environment.

If the English-speaking world is what it was three hundred years ago, so far as qualities of first-class importance are concerned, the reason is that the same qualities are essential to the survival of the men and women. If men who may be regarded as the prize products of civilization are able, when necessity arises, to fight as fiercely as any uncivilized warrior, it is because modern civilized life demands the quality of combativeness in a high state of development. In almost every sphere of life there exists a competitive system of some kind. In education, in the professions, in business, etc., there is a struggle to defeat rivals or to fight against hard conditions. Our laws and our sense of honor forbid the combatants to inflict bodily injury upon each other, or to resort to discreditable practices of any sort—a custom which is on a par with the spirit of humanity, which in modern warfare spares and cares for the enemy's wounded. Trade between nations is in some respects like war. It is seldom a friendly exchange of commodities, but is very often a struggle between rivals to get possession of neutral markets. Modern life, taken as a whole, is very largely conflict—under humane conditions, it is true, but still conflict. This fact explains the survival of physical courage, although there is no doubt that in a civilized state men can and do thrive without it. Nevertheless, as a rule, the combative spirit rests upon a certain basis of physical courage, and is correlated with it. In a similar manner vigor appears to have become correlated during the evolution of the race with a certain stature. Vigor is still in demand, while stature, within certain limits, may be a mere detail. It is not improbable, however, that vigor protects its correlated partner from diminution. Retrogression may be much more rapid than progressive evolution. An organ which has required very many years for building up, such as the horns of cattle, may suddenly disappear, or leave behind only a vestige.

In the human body, however, most structures are "protected" by natural selection or sexual selection. Even baldness of the head, if it makes its appearance before a certain age, seems to be checked by the latter. In other words, young women usually refuse to marry quite young men whose heads are bald. Nevertheless, the incidence of natural selection upon some characteristics has been sufficiently weakened to create a condition of instability. There is a great range of variation, especially of eyesight. Every oculist has

seen patients who, through myopia, can only read a newspaper without glasses by holding it within two inches of the eye, while other patients can read the same type at any distance between about eight inches and three feet. Teeth in the same way vary from complete soundness to almost complete unsoundness. When the survival limit is very low, we may expect a general and rapid deterioration of the human family in the form of loss or decay of the special organ or part of the body which is deteriorating. It is quite possible, however, that the deterioration in the case of the eye and the teeth will not be felt to any extent for the next two or three generations, for optical devices may improve more quickly than the average eyesight will deteriorate. There is, in fact, a race between the easing of the environment on the one side and degeneration on the other, and when the former wins the latter is not likely to make itself felt. In other words, science may for a time defeat physical deterioration. But the victory of science only brings nearer the day of ultimate defeat, for the more rapidly the standard is lowered for any organ, the greater is the resultant instability—in fact, the more rapid the process of degeneration.

In addition to the eye and the teeth there are other organs and qualities which are "protected" on account of being correlated with general vigor. These have continued through centuries of civilization, and it might be supposed that there is no occasion for the slightest alarm on their behalf. During the past half-century, however, the easing of the environment has been so very rapid that even in these cases deterioration is likely to be appreciable, although comparatively slow. Science will in time probably obtain an almost complete mastery over the germs of zymotic disease, while until the advent of bacteriology these germs, allying themselves with some congenital defect, have been responsible for an immense amount of elimination. If pathogenic germs are rendered harmless, congenital defects will work unaided—that is the standard of physique will be lowered. It may be argued that the physical stamina possessed by our ancestors in former times has already been partially lost, and that the matter is unimportant, because conditions of life are much easier, and the physical strength of days long past has ceased to be of value. This argument is plausible, but quite unsound. History tells of a number of peoples which have disappeared because they

ceased to be vigorous, and as a result were conquered by other nations who, while less civilized, were stronger and much hardier. Moreover, what may be termed artificial vigor, produced by progressive and incessant softening of the environment, is a poor substitute for the strength that is a product of hard conditions.

The manner in which the drinking custom, disease, or habit—whichever it may be called—affects the evolution of the race is only apparent after careful study. Most nations appear to possess a craving, great or small, for drinks consisting to some extent of ethyl alcohol. From early times our English ancestors have been noted for their capacity for consuming large quantities of alcohol. There has been, however, for many generations a constant elimination of those individuals who possess an excessive desire for alcohol, consequently a more sober race has slowly been evolved, and, as a fact, the sobriety of any nation, or people, is in direct ratio to the time during which it has been accustomed to alcoholic drinks. The fact cannot be too strongly emphasized that the alcoholic predisposition, susceptibility, diathesis—or whatever term may be applied to the craving—is a germinal variation, a congenital trait which is markedly hereditary. The intoxication is merely the symptom of an obscure pathological state; and the common practice of urging drunkards to abstain from ingesting alcohol is no more sensible than would be an exhortation to an epileptic not to have fits.

The statistical aspect of alcoholism in relation to mortality cannot be discussed, because deaths due to excessive drinking are generally registered as attributable to some other cause. In this city (Buffalo, N. Y.), for example, "apoplexy" is not infrequently given upon death certificates as the primary cause of deaths which were undoubtedly the result of strong drink, and such certificates, not withstanding the writer's protests for many years, are still received with open arms by the Department of Health.

Habitual "soaking," even when not carried to the point of actual intoxication, is most injurious to the constitution, more so, perhaps, than an occasional debauch. Such "soaking" will leave its victim at the mercy of any constitutional weakness which otherwise would not have been fatal. In addition, it must be remembered that alcohol produces a condition of intolerable misery in the home of the consumer of excessive quantities of liquor, leading in some cases to the

death of his children from insufficient food, actual cruelty, or any of the evils which may arise through the unfortunate condition of the father or the mother. If the deaths of children which are traceable to the alcoholism of one or both parents were attributed to the true cause, then alcoholism in the extended sense must be held responsible for a very large percentage of the total annual deaths in most of our great cities. Even if the children who are indirectly the victims of alcohol are excluded, the percentage is high—in New York City and in Buffalo, N. Y., it may be as high as eight per cent. of all deaths. These figures are, of course, a mere estimate.

Degrading and deplorable as excessive indulgence in alcohol is to the individual, it has, in the past, as has already been mentioned, exerted a tendency to maintain the physical strength of the race, and at the same time to develop the moral qualities upon which civilization depends. This apparent paradox is due to the fact that alcohol is one of nature's most powerful selective agents in the elimination of the unfit. In former days when it was the fashion to drink much, all who did not possess sufficient strength of mind to resist the prevailing fashion had to submit to a physical test which tried the heart, digestive system, kidneys—indeed, the entire constitution. The old type of dinner, with many kinds of wine, when every guest was expected to drink, and to drink much was typical of the manners of a former day; and it is evident that the frequent application of such a test of physical stamina would cause the disappearance of a number of weaklings. Further, if the process were continued in each generation through many years, as it certainly has been, there is very little doubt that the race would be characterized by physical stamina, although some of its members would be degraded by the results of their excessive drinking, always assuming that conditions of life were in other respects reasonably favorable. But no constitution can for any long period withstand alcoholic debauches repeated at short intervals. There has, therefore, always been a selection of those who were capable of self-restraint as well as of those who had physical powers of resistance. Quite often the two tendencies are, even to-day, well illustrated by one and the same person, in whom we find physical stamina which "makes light" of a considerable quantity of alcohol, coupled with the self-control which enables him to stop drinking when near the point of intoxication.

Among people of social standing, any condition approaching drunkenness is frowned upon at the present time, and moderation is the fashion. The men who survive are those who have sufficient self-control to resist the temptation to drink, except in very moderate quantity, or who have little inclination in that direction. The latter are obviously those who have not inherited the alcoholic diathesis. The two forms of selection toward moral strength have already had their effect, and the American, or the Englishman of the present day who could hold his own with the "heavy" drinkers of a hundred years ago can hardly be said to exist. Men who combine poor physique with great strength of character are not at all uncommon among our educated classes, and one necessarily admires them. Such men have been made possible by the growing tendency of self-restraint. Knowing where their weakness lies, by care in diet, and by making the most of all the strength which they possess, they are often able under very hard conditions to accomplish more than those who must be looked upon as products of the older and slowly disappearing tendency of evolution among civilized nations. Men of this stamp are able, by the aid of long-continued training and by studying the laws of health, to do much mental and physical labor, chiefly the former, without breaking down. The probability is that in the future this class will be even larger than it is at the present time.

When there is moral, not physical resistance to alcohol, there is, of course, evolution of moral, not physical stamina. To-day, evolution among the Caucasian race is proceeding chiefly on moral lines, and it is almost certain that this procedure will continue, unless the tendency is counteracted by influences which are quite imperceptible at this moment. Nevertheless, although the undoubted drift of evolution is toward a higher morality and a lowered physique, it is possible that, by means of the science of eugenics, methods may be found of mitigating the evils which seem destined to accompany the gradual ennoblement of human character.

Alcohol is a force which, in the past, has had an influence upon race-character. When excessive drinking has been the fashion, a physical constitution strong enough to resist the ill effects of a large amount of alcohol has been, for many of the male sex, a condition necessary for survival. But in our day, as a result of moral evolu-

tion, there is for those who have inherited the alcoholic diathesis another way of resisting the "liquor habit," viz.:—to abstain absolutely from the consumption of all so-called intoxicants. As has been mentioned, when this mode of resistance is resorted to, increased moral evolution takes the place of physical; and the test which alcohol is now applying to young men of the educated classes, at any rate in our country, is, as a rule, a moral not a physical one. As a consequence, there are signs that a race is arising which is unable to consume even such quantities of alcohol as our grandfathers, many of them still living, consumed with considerable regularity; and as generations pass, we may expect that this physical "defect"—if that term can be used—with its accompanying mental superiority, will be increased. White men will not be able to tolerate the toxic properties of alcohol, and they will also be less tempted by it. In this manner the physique of a considerable portion of the male population will continue to be lowered through the strengthening of moral principle. Up to now, however, there have always been numbers of men whose regular ingestion of alcohol exceeded the quantity which their physique could withstand. These men represent what may be termed the extreme alcoholic type, and their ranks are still being thinned by alcoholism, pneumonia and tuberculosis, in many cases before they have added to the population progeny inheriting their pathological craving. This is, of course, merely the process of natural selection.

Alcohol eliminates others in addition to those whose desire for it is abnormal, and those who partake of it because the custom of drinking is—or was—the fashion of the day. Its victims are sometimes men, and occasionally women, who have fallen through some defect of character quite unconnected with alcoholism, and who have tried to drown their cares by drinking. Many of these persons have not inherited the alcoholic diathesis, although the defects and the moral contortions which they possess are frequently hereditary; and such individuals are duly eliminated, alcohol being directly or indirectly the agent. Here we enter a region which is not, and in all probability cannot be illuminated by statistics. Could we penetrate the gloom, we might see numerous tragedies in the lives of both sexes—first, some incipient failure or deviation from the right course; after a time, loss of hope; and, finally, alcoholism sweeping

away useless members of the community, not infrequently with the assistance of suicide. In this manner, alcohol, in the past, has undoubtedly acted as a selective agent. Unfortunately, as all the world knows, its methods are such as bring untold misery, not only to those who succumb to it, but to many others. But this fact ought not to blind us to the selective services which it has rendered to our race, and among them we must rank high its ability to weed out depraved tendencies and deficient stamina, which, however injurious to the community, might otherwise persist—and with the elimination of alcoholic selection are likely to persist—through many generations before receiving the penalty which they deserve.

When all the facts are considered—and this article only gives a bird's-eye view of a few of them—the conclusion is irresistible that racial deterioration, so far as physical qualities are concerned, has begun in earnest, and is likely to continue, unless the subject receives much more attention than is at present being devoted to it.

Pædiatrics

RETARDED MENTAL DEVELOPMENT IN CHILDREN

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In a previous article [1] I have defined the backward child as one "who is retarded in his development by reason of some condition either inherent in the child himself, which can either be removed or counteracted, or who is subject to some physical defect or environmental condition, the removal of which will allow him to progress in a normal manner under favorable opportunities." He differs in a great many ways from the feeble-minded child of any grade, but in this the most: that he will progress in a normal manner when given a favorable opportunity. There is a tendency both in this country and abroad to apply to the high-grade imbecile the term "backward child," apparently more for the sake of euphemism than for any other reason. For instance, Barr states: [2] "Another phase of mental defect either previously unrecognized or else belonging specifically to a later period has developed the term 'Backward Child,' one unable to advance rapidly. The differences, we note, are of degree, not of kind. In reality, from the idiot, through the various grades of imbecility, up to the backward and the feebly-gifted, there is a regular ascending scale, ever lessening, of mental defect." This confusion of terms is met with constantly throughout the literature upon the subject of exceptional children. On the other hand, the British Royal Commission on the Care and Control of the Feeble-minded in its report makes a distinction between the actually deficient and those only apparently so by suggesting special provision for those cases in which it is doubtful whether the child is merely dull and backward or is actually mentally defective. When a period of continuous observation is necessary to decide this point, such cases may be received for a period of probation in special

classes, schools, institutions, or homes for the mentally defective, and will be frequently and periodically examined.[3]

To indiscriminately class together all children whose mental powers do not conform to a certain set standard is manifestly unjust. Not only does it complicate the matter of diagnosis, but, more important still, that of prognosis as well. No one at this date will claim that idiocy, imbecility, or feeble-mindedness can be cured by any method of treatment or training. Intact brain cells may be brought up to a comparatively high grade of efficiency, but those congenitally absent or later destroyed by disease or injury can never be supplied. It is of the utmost importance, therefore, to differentiate those children who are essentially mentally deficient from those only apparently so,—that is, the retarded or backward.

CLASSIFICATION OF RETARDED OR BACKWARD CHILDREN

1. Those retarded by reason of environmental influences.
   - (*a*) Neglected children.
   - (*b*) Children of foreign parentage.
   - (*c*) Spoiled children.
   - (*d*) Children whose school attendance has been irregular.
2. Those of physiologic slow rate of development.
   - (*a*) Those uniformly slow.
   - (*b*) Those slow in some particular faculty.
3. Nervous, unruly children.
4. Those retarded because of depression of function or biologic variation in special cerebral centres, particularly in those centres making up the zone of language.
5. Those retarded because of physical defects.

I. CHILDREN RETARDED BY ENVIRONMENTAL INFLUENCES

Children retarded because of environmental influences concern the physician directly only in so far as diagnosis is concerned, after which they become a problem for the sociologist and the educator. It is often a matter of difficulty to eliminate other factors which may contribute to the retardation, such, for instance, as inherited degeneracy or physical defects, and to say definitely that the child's condition is due to faulty environment alone. In fact, it is very

unusual to find a case in which environment, while perhaps the determining factor, is yet the only factor to be considered. The following is a case in point:

W. W., aged 2½ years. Examined at the request of a probation officer of the Juvenile Court. The child could neither walk nor talk. The mother is a prostitute. She was 18 years of age when the child was born. The father was 19. The mother comes of a criminal family; five close relatives are represented in the rogues' gallery. The father is a degenerate who had been subsisting upon the woman's earnings until he was sent to prison to serve a term for larceny. Previous to the mother's desertion what little attention the child received was furnished by the father. He had been given whatever food happened to be at hand, no efforts at cleanliness had been made, and he was neglected in every possible way. When brought for examination the child had been boarded out in a good home for several weeks and had been cleaned up and made to look like a human being. In spite of his early treatment he was as fat and healthy a baby as one would wish to see. Although the child could hardly have had a worse family history, and in spite of the fact that delayed walking and talking are among the most constant symptoms of mental defect, it was impossible at this time to class him as feeble-minded. He had enlarged tonsils and adenoids, but no other physical defects, and no marked stigmata of degeneracy. He was bright and alert, and responded well to all mental tests that could be applied to a child of his age. During the short time that he had been receiving proper care he had made rapid progress. While it is, of course, impossible to determine what this child's condition will be later on in life, whether or not as development proceeds hereditary defects will make their appearance, yet in my mind it is true that mentally he is normal at the present time, and that his inability to walk and talk is due not to mental incapacity but to lack of the stimuli of example and imitation. He has been placed in a suitable environment and his subsequent progress will be closely watched. (See footnote.)

I do not wish to seem to depreciate the influence of environment. It is most important, either for good or evil, but I do wish to emphasize the fact that the environment must always be studied in its relation to the particular child under consideration. That an individual, a nation, or a race without inherent defect may rise superior to its immediate environment history has amply proved. On the other hand, evolution has shown how environment seizes upon the defect and aggravates it to ultimate somatic destruction.

NOTE.—I have very recently been advised that the child now walks and talks, and shows normal intelligence in every way.

II. THOSE OF PHYSIOLOGIC SLOW RATE OF DEVELOPMENT

It is generally considered that the normal child should at certain chronological ages develop certain instincts, powers, faculties, anatomical peculiarities, and physiological functions. Any marked deviation at once gives rise to a suspicion of possible abnormality. It is nevertheless true that a comparatively wide variation from any arbitrary schedule is possible without the existence of grave defect.

The physiological retardation in the acquisition of speech which sometimes occurs is worthy of more than passing notice. Usually a child has begun to acquire a more or less extensive vocabulary by the end of his first year and to form sentences by the end of his second. Failure to accomplish this after deaf-mutism is eliminated gives rise to a suspicion of mental deficiency. I have found by inquiry into the early history of normal adults that a late assumption of function on the part of the faculty of speech is not rare. Preyer [4] states that he himself did not learn to speak until toward the close of his third year.

The Röntgen ray studies made by Dr. Rotch [5] upon the development of bones have shown that chronological and anatomical age are by no means identical. Crampton's [6] investigations upon the time of onset of puberty show the wide variation possible in the appearance of physiological functions.

III. NERVOUS, UNRULY CHILDREN

The nervous, unruly child is not necessarily a backward one; very often he is precocious. His precocity is, however, seldom uniform; certain faculties are usually developed at the expense of others equally important, or he possesses a well-developed brain and a poorly-developed body. In the production of nervousness in children both heredity and environment are of great etiological significance. Should there be present in the progenitors conditions and diseases having a vitiating influence upon cell activity, such as tuberculosis, syphilis, cancer, malaria, alcoholism, drug habits, insanity, goiter, malnutrition, or any of the various diatheses or intoxications, it is very likely that the descendant will be lacking in some of the elements necessary for proper development,—*i.e.*, will be hypoplastic. This hypoplasia may affect the gross anatomical structures and result in anencephalic or other monsters, idiocy, spina

bifida, absence of members, cleft palate, harelip, or other major stigmata of degeneracy. If it be but slight in degree we have only a slight involvement of the structural elements of the central nervous system, with or without the minor stigamata of degeneracy.

The result is the individual predisposed even in childhood to the various affections having their origin in nervous and mental instability, such as hysteria, chorea, tics, migraine, cyclic vomiting, phobias, pavor nocturnus, etc. Later on in life he is subject to neurasthenia, hypochondriasis, alcoholism, and drug addictions, and, in more extreme cases, the psychoses.

The innate characteristics manifested by the nervous child are apt to be aggravated by the environmental influences to which he is subjected. Foul air, poor and insufficient food, lack of discipline, improper association, exposure to extremes of heat and cold, disease, late hours, all have their vitiating influence. Even the child of prosperous but nervous parents is exposed from birth to all the inconsistencies, errors of judgment, and excitations made possible by the state of his elders. He is born into a hurried life, constantly exposed to bright lights, noise, and confusion. Sensations crowd in upon him with a rapidity out of all proportion to his receptive powers. He responds to an exaggerated degree to stimuli of any kind; starts at sudden noises, bright lights hurt his eyes, powerful odors nauseate him, an unexpected touch will make him jump. He undertakes with apparent energy allotted tasks, but soon tires. He laughs and cries for little or no reason, is capricious, and will fly into a temper on the smallest provocation. He is often imaginative and may seem to prefer falsehood to truth, though, to do him justice, it must be said that he often believes to be the truth what is only the result of his excessive imagination.

A large proportion of the children brought before our Juvenile Courts are of the type just described. Demanding, as they do, the stimulation of constant change, their school duties soon become irksome, they play truant, spend their time at the cheap theatre or moving-picture show, begging or stealing the sum necessary for admission. Meeting with others of the same kind, they form gangs and commit depredations which they would singly not dream of attempting.

IV. THOSE RETARDED BECAUSE OF DEPRESSION OF FUNCTION OR BIOLOGIC VARIATION IN SPECIAL CEREBRAL CENTRES, PARTICULARLY IN THOSE CENTRES MAKING UP THE ZONE OF LANGUAGE

In this class are included:

Congenital word-blindness.
Congenital figure-blindness.
Congenital word-deafness and idioglossia.
Stuttering.

Medical literature contains but little reference to congenital word-blindness previous to 1896, though Clara Harrison Town [7] finds that Broadbent, as early as 1872, described a case which combined total word-blindness with very limited power of speech. In 1896 both Dr. James Kerr and Dr. W. Pringle Morgan reported cases of this condition, followed by Thomas, Fisher, Stephenson, Hinshelwood, and others. In 1909 [8] I was able to collect more or less detailed descriptions of forty-one cases, to which I added one case associated with stuttering which had come under my own observation. Since the report alluded to I have had the opportunity of studying two other well-marked cases, and a sufficient number have been described by various other observers to show that the condition is by no means rare. The following case previously reported [9] is typical of the condition:

J. H., referred by the Juvenile Court. First examined March 6, 1911; age, 15 years. Father became addicted to the excessive use of alcohol several years before his death from tuberculosis, though at the time of, and prior to, the birth of this child his habits were excellent. He (the father) had never been able to learn to read, although he had attended school and was a good workman, taking good care of his family until incapacitated by illness. Three older brothers of the patient, one of whom is a locomotive fireman, have never been able to learn to read, in spite of every opportunity. The family history otherwise is negative. The birth conditions of the patient were normal. Nothing unusual was noticed in his early development except that he did not attempt to talk until the age of two years. He had whooping-cough at two years and a slight attack of measles at four. He entered school at the age of six years, but never progressed further than the first grade. Physically the boy is in good condition. He shows no major stigmata of degeneracy. He has an error of refraction which has been corrected by glasses. He responds well to all mental tests which do not require the ability to read, is self-reliant and resourceful, comes alone from his home, about ten miles from the city, by train and then about five miles by street car, making all connections properly and buying his own tickets. His regard for the truth is, however, not of the

greatest, nor can his obedience be depended upon. For this, faulty upbringing may, for the most part, be responsible. His recognition of figures and their combinations is good. He is able to name by sight nearly all of the letters of the alphabet, but until after his training had been undertaken he could not read a single word.

Hinshelwood states in his book [10] that "all the varieties of word-blindness met with in clinical experience can be intelligently explained by regarding them as disorders of the visual memory produced by lesions affecting more or less completely a definite area of the cerebral cortex in which are preserved the past impressions arranged in definite and ordered groups." In congenital word-blindness the involved area is affected before any visual word-impressions have been received. It is not due to a lesion in the sense of pathological alteration of tissue, unless such alteration be due to injuries received during intra-uterine existence or during birth. The fact that the condition is more commonly found in the male sex would incline to the view of birth injuries being responsible, as the larger size of the head of the male child at birth would render it more liable to injury. However, a history of difficult labor could not be elicited in any of the cases I have mentioned, nor do I believe was it mentioned as a possible factor in any of the cases reported.

The most satisfactory explanation is that congenital word-blindness is due to a biologic variation in the visual word centre, and is closely related to such conditions as color-blindness, lack of musical sense, etc. This is borne out by the fact that it is not unusual for several cases to occur in the same family. Thomas [11] reports a mother and six children affected, and in another family two brothers. A maternal uncle of Fisher's [12] patient did not learn to read until he was ten years of age, and even in adult life was a very poor speller. Stephenson [13] notes a case in which the condition "affected three generations of a family, passing from the first to the second generation by an affected female, and from the second to the third generation by a female, herself unaffected." Hinshelwood [14] reports cases in four brothers, Plate [7] four cases in three generations of one family, and Peters [7] two cases in one family. The case reported above shows a marked familial tendency.

Of word-blind children, about one-half are also letter-blind, while

but a small proportion are unable to recognize figures. In fact, some of them are unusually good at arithmetic, and the facility with which some recognize musical notes has been noted.

In the milder cases words of two or more syllables are the only ones with which there is difficulty. In these cases and in those slightly more marked the longer words may be recognized by first forming the sound with the lips, thus appealing to the glosso-kinæsthetic centre. In the more severe cases, and especially in those in which there is more or less letter-blindness, there may be total inability to read a single word.

Congenital Figure-blindness.—A small proportion of patients subject to congenital word-blindness are figure-blind to a greater or lesser degree, although some are exceptionally good at arithmetic.

Congenital figure-blindness unassociated with word-blindness has not, I believe, been described, though in speaking of acquired aphasia Bastian [15] says "on rare occasions it has been found that loss of ability to read and comprehend numerals exists in the absence of word-blindness." Taking these facts into consideration, it would seem that the visual impressions derived from numerals are registered in a brain region which is slightly removed from the visual word-centre. There are children who while bright in subjects in which figures are not required, and able to recognize the letters of the alphabet both singly and when combined to form words, have very poor visual memories for numerals. Such children fall far behind in their classes and often fail of promotion on account of inability to learn mathematics.

Congenital Word-deafness.—Congenital deafness always entails mutism, as does acquired deafness occurring before the child has learned to speak. Even the child of five or six years who has learned to talk will forget how when deprived of the faculty of hearing. It is obvious, therefore, that the child who, although possessing the ability to hear ordinary sounds, is unable to appreciate and retain impressions of spoken laguage, will fail to acquire the faculty of speech. To differentiate mutism resulting from word-deafness from that which is entirely motor in character often requires close and prolonged observation.

Congenital word-deafness has received less attention than has congenital word-blindness, though Gall, as quoted by Clara Harrison

Town in her article on "Congenital Aphasia," [7] as early as 1861 described a class of children which in my opinion exhibited many of the symptoms of this condition.

Partial word-deafness gives rise to a condition of defective speech so peculiar as to give the impression that the child uses a language of his own. To this condition the name " Idioglossia " was given by Dr. Hale White and Mr. Golding-Bird.[16] Guthrie [17] in his book devotes an entire chapter to the consideration of this condition, giving a detailed analysis of his own cases and those of other observers, and suggests that as in none of the cases was hearing anything but acute, so far as mere audition of sounds was concerned, yet it is probable that there was present some defect of auditory perceptive centres in the sense that distinctions between sounds are not appreciated. The speech of the child with idioglossia is almost unintelligible except to those who have become accustomed to it. While upon analysis it will be found to bear a more or less marked resemblance to normal speech, one's first impression is that he is listening to meaningless gibberish. It will be found that in each individual the sounds substituted are always the same for the same words, though the substitutions vary in different individuals. Thus we may have one child with idioglossia laughing with amusement at the, to him, unintelligible speech of another.

A case of my own [18] rendered, "Go to bed "—" Do bei," " Piece of candy "—" Pe tandy," " at "—" ha," "wax"—" wa " ; another case,[9] " Leonard "—" Yearner," " mamma "—" nannie," " wolf "—" dulf," " little "—" yittle " ; " Rock-a-bye baby, your cradle is green "—" Dock-dye day, er tadle e dien."

Stuttering.—Although stuttering is very generally considered to be a purely nervous condition, depending only upon inco-ordination of the mechanism controlling the organs of speech, I am still inclined to follow Claiborne's suggestions [19] that it should be classed among the conditions having as their basis congenital defects in the centres controlling speech. Scripture [20] has observed that practically all stutterers habitually speak in a monotone, that they lack the power of speaking rhythmically. In a previous article [21] I suggested that there exists a distinct relationship between stuttering and a partial congenital amusia. If we accept the theory held by Edgren and others that the different forms of amusia are dependent

upon damage to special centres and commissures which are adjacent to, but not identical with, those whose damage gives rise to the corresponding forms of speech defect, we must assume that an auditory centre for tones will correspond with the auditory word-centre, a kinæsthetic tone-centre with the kinæsthetic speech-centre, and a visual centre for notes with the visual word-centre.

Nature is all curves and harmony. We are constantly receiving through the special senses impressions suggestive of modulation, inflection, and consonance. On the visual centre are registered impressions of form derived from the contour of hills and sky, from the flight of birds, the waving of the branches of trees, the falling of leaves; on the auditory centre, from the sound of running water, the soughing of the wind, the rustle of leaves, the songs of birds; on the centres controlling the sense of touch are registered the impressions received from the handling of smooth and rounded objects, and on the general kinæsthetic centres the impressions of rhythmical movements made in walking, running, bending, climbing, breathing, etc.

It seems, therefore, not unreasonable to suppose that these various impressions, registered, as they are, in areas of which the centre concerned in speech is a part, have much to do not only with its development but also with the proper control of the nervous mechanism of the speech-forming organs. To state more clearly, it would appear that impressions of modulation, inflection, consonance, and rhythm are registered in special centres which are a part of the general visual, auditory, and kinæsthetic areas, and that each of these, besides being in direct relationship with the word-centre of the particular area of which it is a part, is also in commissural relationship with the corresponding centres of other areas. I therefore believe that the monotonous voice of the stutterer is the result of a biologic variation in one of the music-centres or its commissures, most likely in the kinæsthetic centre or the commissure between it and the auditory music-centre. It may be held that not all those with unmelodious voices stutter. While they may not habitually, a distinct tendency to stuttering will be found, especially when laboring under strong emotion or fatigue, or when in poor physical condition, as when recovering from severe illness. The child usually does not stutter when he first begins to speak, but if he

be the possessor of the monotonous voice he will do so as soon as he is subjected to one of the exciting causes mentioned above or to reflex irritation from any source, be it eye-strain, phimosis, adenoids, or worms. The compulsive idea then becomes fixed.

V. SOME PHYSICAL DEFECTS CAUSING RETARDATION *

Malnutrition.—Malnutrition in childhood is more than a question of insufficient food. We find it among the children of the well-to-do as well as among the poor, and may even find an excellent state of nutrition where the food supply is scanty. Badly-chosen and ill-cooked food is fully as productive of harm as is an insufficient supply.

There has been described under the term "infantilism" a condition of underdevelopment in which the individual retains, to a greater or lesser degree, the characteristics of childhood at a time when they should have disappeared. The term denotes a type of bodily and mental make-up, not a distinct disease. As it is in danger of being confused with the more pronounced types, the forme fruste or myxidiocy of Brissaud which closely approaches cretinism, or the infantilism of Lorain, it seems well to use the term "hypoplasia," unsatisfactory though it may be. The hypoplastic tends to approach the Lorain type of infantilism, though usually to only a slight degree. The condition may be congenital or acquired during infancy or early childhood. The same factors given as causes of cachectic infantilism by Thomson [22] may also be responsible for the perversion of nutrition occurring in the hypoplastic. Noble [23] gives an excellent description of this condition in girls at the time of puberty when he says: "The neck of the normal girl loses its flatness, such as a boy has, and it is no longer possible to see the sternocleidomastoid muscles. The subnormal girl retains the body form of the child, wherein girl and boy are very much alike in their figures. The bones fail to develop, the hips fail to broaden, and the limbs, the body, and the face do not attain the rotundity which characterizes the woman as distinguished from the man. The breasts do not develop, and in extreme cases the pubic hair is late in growing." Further on he states: "Such women are mentally unstable, and everybody says they are peculiar. They are not like other women,—that is, they have hypoplasia of their entire bodies. It is not merely arrested

* Figs. 1 to 5 show various forms of physical defects causing retardation.

Fig. 1.

Defective teeth.

Fig. 2.

Mentally retarded boys.

Fig. 3.

Hypertrophied tonsils and adenoids and astigmatism.

Fig. 4.

Enlarged tonsils and adenoids and deficient vision corrected.

Fig. 5.

Idioglossia, hyperopia with astigmatism, convergent strabismus.

development of the body in general. Their bones and their muscles, their hearts and their arteries, and, most of all, their nervous systems—central spinal nerves and sympathetic—are imperfectly developed,—that is, organs and parts are in a state of hypoplasia or arrested development." It is not necessary, however, to delay until adult life, or even until puberty, to be able to recognize the hypoplastic individual. Symptoms may show themselves soon after birth or may not appear to any marked extent until early infancy is past. Among the early symptoms to be noticed are: delay in the power of walking and talking, late closing of the fontanels, irregular dentition, etc. Progress in these respects may, however, be entirely normal, possibly even more rapid than normal: the precocious child is often an hypoplastic one. Among the most prominent early signs are enuresis, nocturnal or diurnal, lymphatism and enlarged tonsils and adenoids. Graves [24] finds the scaphoid scapula to be common among the type of cases which I would call hypoplastic. He states that 47 children, reported to be much behind in their grades, were all undersize, showed various anomalies in development, 58 per cent. were mouth-breathers, 17 per cent. were subject to enuresis, and 85 per cent. showed the scaphoid scapula. The high-arched palate, produced by the yielding of the palatine bones owing to their relative poverty in calcium salts, is a fairly constant symptom.

It is now pretty generally conceded that the chain of ductless glands is of the greatest importance in the development of the cerebrospinal and osseous systems in early life, and that impairment of the functions of one or another of these glands underlies the disorders of nutrition which inhibit proper development.

Malnutrition is usually hypoplasia plus malnutrition, sometimes entirely dependent upon the hypoplasia, often further complicated by insufficient or faulty diet.

It will be seen that in the consideration of the various physical defects which operate as etiological factors in backwardness this factor of hypoplasia enters very largely.

Adenoids and Hypertrophied Tonsils.—Hypertrophy of the faucial tonsils and of the adenoid tissue situated in the nasopharynx has long been recognized as an important predisposing and causative factor in the etiology of many of the pathological conditions of infancy and childhood.

That enlarged tonsils and adenoids are likely to occur in individuals subject to what might be termed special diatheses has been commented upon by many observers. Noble [23] says : "Is not this the same pathologic condition (cell hypoplasia) found in the throat and called adenoids and diseased tonsils, and does not this theory explain this group of debilitated women, and also all the children who are not vigorous and who get adenoids and diseased tonsils and become mouth-breathers ?" Williams [25] believes that the hypoplastic condition found in children subject to enuresis is due to thyroid insufficiency, and the results of thyroid medication tend to bear out his contention. He believes that adenoids and hypertrophied tonsils are compensatory in their action, correcting, as it were, the thyroid insufficiency. In this connection Citelli states : [26] "It is not probable that the tonsils belong to the so-called organs for internal secretion, but in view of certain general or secondary disturbances which are found in adenoid-bearing subjects, which often disappear after an operation, and more especially on account of anatomic researches, I believe it probable that the hypertrophy of the tonsil alone can determine, first, the functional, and then the anatomic, alterations of the pharynx and central hypophysis." Hypoplastic children with pathological conditions of the faucial and pharyngeal tonsils are often subject to the diathesis known as the "status lymphaticus," in which there is a general enlargement of the lymphatic structure associated with hyperplasia of the thymus gland and hypoplasia of the circulatory apparatus. Hypoplasia of the circulatory system is found in chlorotic subjects, who as a rule present other symptoms of defective development, including hypertrophied tonsils and adenoids.

The diagnosis of the diathesis predisposing to hypertrophy of the lymphoid tissues becomes essentially the same as that of hypoplasia.

That backwardness in physical and mental development may exist without the presence of hypertrophied tonsils and adenoids, and that hypertrophied tonsils and adenoids may fail to give rise to appreciable symptoms, is not denied. I believe, however, that careful investigation will not fail to reveal symptoms of hypoplasia accompanied by signs of nervous instability in children in whom enlarged tonsils and adenoids are present.

The alterations in the bony structures of the face and thorax secondary to hypertrophied tonsils and adenoids are too well known

Fig. 6.

Hypoplasia, malnutrition, mal-occluded and carious digestive disturbances.

Fig. 7.

Word-deafness with partial general deafness (congenital) resulting in delayed defective speech.

Fig. 8.

Two mentally retarded boys. Microcephalic.

Fig. 9.

The mentally retarded boys in the home school. All hydrocephalic.

to require description, as are the malnutrition and lessened resistance to disease accompanying and resulting from these conditions. I will therefore limit myself to the consideration of those conditions of retarded mental development directly caused by the mechanical obstructions resulting from their presence. Tonsils either hypertrophied beyond the normal size or diseased, and adenoids persisting beyond the normal period of atrophy, are practically foreign bodies, and as such act as peripheral sources of reflex irritation. The difficulty of breathing which is experienced by children subject to these conditions adds further to their discomfort and results in inability to concentrate the attention. Bonazzola [27] found "among four hundred school children at Bologna that 141 displayed a want of power to concentrate the attention. Examination of this group revealed adenoid growths in all but 24. In the 24 with aprosexia without adenoid vegetations there invariably was nasal obstruction from some other cause, and the children were neurasthenic and presented signs of inherited physical degeneracy." The aprosexia resulting from enlarged tonsils and adenoids is probably responsible for more cases of backward and deviate mental development than any other cause. The child, unable to apply himself to his studies, soon falls hopelessly behind his classmates and casts about for other means for the employment of his mind, thereby getting himself into mischief of all kinds, soon becomes a nuisance to his teacher and to his schoolmates. The long hours of school then become irksome to him, and he plays truant, thereby enlarging the field for his unrestrained activities. Finally, through his desire for constant change and excitement, he comes into conflict with the authorities and ends in the Juvenile Court and the reformatory. Judge Mack's "straight road from adenoids to the penitentiary" is not an exaggeration. If he be of the phlegmatic type, more or less immune to peripheral stimuli, content to plod without result, to stay where he is put, he soon becomes the class dunce, remaining in the same grade until, either outwearing the overstrained patience of his teacher or outgrowing his seat, he is advanced to the next grade, there to repeat the process. These are extreme cases, but they are to be found in every school, and many others lesser only in degree in practically every class-room. The hypoplastic child, fundamentally unstable, and still further handicapped by nasal obstruction with its attendant train of evils,

is prone to respond to faulty environmental influences of all kinds to an exaggerated degree, and requires the most careful study and attention to ensure the mental and physical development of which he is, in a great number of instances, capable.

Partial Deafness.—Adenoids are the most prolific causes of deafness occurring in childhood. Congenital anomalies of hearing, not amounting to total deafness, are comparatively infrequent compared to those cases having adenoid vegetations as an etiological factor. Kyle states :[28] "In at least ninety per cent. of cases of adenoid vegetation there is involvement of the eustachian tube with deafness in varying degree."

If the deafness be marked and occur before the child has learned to talk he will remain dumb. Even should he become deaf after he has acquired the faculty of speech, at the age of five or six, he will soon forget how to talk. There is no faculty upon which mental development is dependent to such an extent as upon that of speech. Thought in its higher functions exists only through expression by means of language, of which articulate speech is the most important manifestation. It is impossible to reproduce as speech sounds which one has never heard, consequently in the deaf two great stimuli to mental development are lacking : the power of understanding spoken language and the faculty of expression by means of speech. Partial deafness may give rise to a peculiar form of speech practically identical in its symptomatology with idioglossia. The analogous condition occurring as the result of deafness may result either from slight deafness due to middle ear disease, which permits the child to hear only those sounds of a certain pitch or intensity, which he will, of course, reproduce as heard, or to faulty subjective audition, the objective hearing being normal. In the latter case he hears the words correctly and believes that he reproduces them as he hears them. His subjective auditory centre has become accustomed to the reception of faulty word-impressions, and has lost or failed to develop its powers of differentiation. This condition is dependent upon faulty kinæsthetic impressions derived from the peripheral musculature concerned in speech, and due in most instances to malformation and to the presence of enlarged tonsils and adenoids.

Defective Vision as a Cause of Retardation.—"All the progress of evolution of the higher forms of animal life has depended upon eye-

sight. Self-motility and intellect are conditioned upon ocular function, and civilization is possible only by perfection of ocular function" ; "the eye is a part of the brain,—the brain itself comes out to see, the retina being cerebral substance told off to a special peripheral and extra cerebral function and placing. This is so with no other organ of the body, and it not only demonstrates that vision and intellect are united in a common work, but that they are united in being, one in origin, one in nature, one in function, one in history.[29]

Defective vision acts as a causative factor in two ways : First, by offering an obstruction to the passage of true, clear visual impressions to the brain, as in case of injury to the eye, refractive error (hyperopia, myopia, astigmatism), muscular imbalance, degeneration of the optic nerve, or brain tumor; and, second, by reflex action upon the nervous system and upon the general health. It is with errors of refraction and muscular insufficiency that we have most to deal. These conditions are also the most prolific sources of eye-strain. The child with astigmatism, for instance, sees all objects more or less distorted, and is under the constant necessity of performing a series of mental adjustments regarding the size and shape of objects. Unless he recuperates nerve and muscle energy very rapidly, he is on the verge of nervous exhaustion all the time. It is small wonder that he becomes stupid and apathetic, or nervous and irritable. Unconsciously he assumes a biased attitude toward his whole environment which cannot help but react not only upon his entire system but upon his mental progress as well.

In muscular asthenopia the object may be blurred, indistinct in outline, or even appear double, temporarily or permanently, with consequent disturbance in mental equilibrium.

When ocular anomalies occur in a hypoplastic individual the results are more far-reaching than when the subject is a person of sound mental and physical make-up. "In a considerable number of cases the error of refraction is merely one evidence of a faulty organism, among other signs of which appear headache, the invalid habit, vertigo, indigestion, irritability, and allied nervous states, to say nothing of choreic movements, epilepsy, and other motor phenomena whose relation to eye-strain is not yet definitely determined." [30]

It is during the school life of the child that refractive errors, par-

ticularly myopia, ordinarily develop and attain to a high grade. So directly can myopia be traced to the school life of the child that the term *Schulmyopie* (school myopia) has been adopted by many German writers. In Brussels it has been found that, while only 5½ per cent. of the youngest pupils were myopic, the percentage progressively increased with the age of the pupil, until in the oldest classes 18 per cent. were affected. As regards the effect upon the vision at least, the prevalent methods of teaching and the conditions under which they are carried on are radically wrong. Young children should not be set to do fine work, whether weaving, sewing, writing, or reading. They usually acquire the habit of bringing such work close to the eyes, especially when working under conditions of bad illumination, shape of desks, height of seats, etc. There is usually an excessive amount of home work, required of all pupils alike, without regard to individual variation, to be done, often by badly-arranged and insufficient light, because the best hours of daylight are given up to exercises or occupations unrelated, or at best remotely related, to the curriculum.

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THE PSYCHOLOGICAL CLINIC AS AN INTER-CLINIC

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Our age is distinguished for its specialization. Schemes for social amelioration have imitated industrial divisions of labor. Just as the plumber tears up the bathroom floor to mend a water-pipe and leaves the boards for a carpenter to replace and the painter to paint, so specialists in professional lines mark out their principalities in human activities, or human anatomy and physiology. The hoary-headed joke of the doctor who threw all his patients into fits because that was his specialty squints towards the truth.

Specialization has brought with it a multiplicity of organizations. Again, the industrial world, with its amalgamations and unions and locals, might be specified as the example *par excellence*. The professional field is not one whit behind it. There are clinics, for example, for birds and beasts; for cats and dogs; for filling horses' teeth and trimming Fido's tail; for all the ailments and all the organs of poor humanity, and still the innovations multiply.

In such a situation a new clinic must give a reason for its existence. To announce a Psychological Clinic rather arouses suspicion of crowding and overlapping than of gratitude for a new aid to mankind. Still, the Phychological Clinic is with us and has been with us since Dr. Lightner Witmer, Professor of Psychology at the University of Pennsylvania, began to receive children at his laboratory, seventeen years ago. Within the last five years the clinic has been amplified, better organized, and receives children daily. It has its suite of rooms, its apparatus, its staff of examiners, and its social service department.

The first characteristic of the Psychological Clinic is the breadth of its specialty, if I may so express it. True, it treats only special or unusual children. But instead of treating a part of the patient, it does not shrink from encompassing the whole child in its examination and care. This at once makes it as broad as human society and brings within its scope literally every juvenile interest, from multi-

plication tables to blind alleys. Many of the cases it treats are brought because the children cannot succeed in arithmetic, and many others because moral delinquency has developed from lack of play space and from filthy surroundings.

Specifically stated, the purpose of the Psychological Clinic is to examine and to diagnose or classify exceptional children. Such children can be called mental or moral deviates. A few of the mental deviates are precocious, but most of them are mentally retarded. The mentally retarded cases can all be divided into two classes: the temporarily retarded and the permanently retarded. The latter can be further sub-classified as morons, imbeciles, and idiots, each sub-class consisting of three grades—high, middle, and low.

The need of such a clinic will be made plain by a few statistics giving the number of temporarily and of permanently retarded children in America. An investigation into thirty-one urban school systems shows that 33.7 per cent. of the pupils are pedagogically retarded,—that is, they are one year or more behind the grades they should be in, considering the legal age for entering school and their opportunities for promotion. This means that out of 18,000,000 children a little over 6,000,000 are pedagogically retarded.

The mere fact of pedagogical retardation does not necessarily mean mental retardation. Still, it does mean backwardness in a most important activity of a child's life, and usually, since especially poor scholars take advantage of the legal age to leave school, it means an intellectual handicap for life.

So much for the mere fact of pedagogical retardation. When we inquire into the causes of it we come closer to the kernel of the matter. Briefly, we may say that the cause of such backwardness lies either within the child or in his surroundings. If the cause is without the child, it is pedagogical or sociological, and lies in the school, the curriculum, the teacher, or in the home, or in the neighborhood.

Just at this critical juncture the Psychological Clinic performs its most valued service and finds the justification for its existence. For teachers and parents formerly had only one prescription for the laggard in school, and that was the pedagogical principle advocated by the Hoosier Schoolmaster, "The more lickin' the more larnin'," set forth more artistically in Barnard's English Pedagogy, where Crabbe's schoolmaster says:

"Students, like horses on the road,
Must be well lashed before they take the load;
They may be willing for a time to run,
But you must whip them e'er the work be done;
. . . . . .
Let no fond sire a boy's ambition trust:
To make him study, let him see he must."

And if the family physician were consulted by an anxious mother about her son's slow progress,—unless the boy showed some abnormal response to the clinical thermometer, stethoscope, or other simple physical test,—I darkly suspect that the doctor, too, would fall back upon the well-worn formula of a hickory gad compounded with a liberal measure of paternal ire and applied, not to the patient's cranium but—oh, ye gods, tell us why!—to the antipodal extremity of the patient's spinal cord.

This was the old way, and there are many who still believe it a good way. The Phychological Clinic does not. It attacks the problem scientifically; assumes that there is a cause for retardation; makes a thorough examination; records its results, and has already demonstrated that temporary removable defects like hypertrophied faucial and pharyngeal tonsils, impacted and defective dentition, fatigue, and malnutrition are all causes in various degrees of retardation.

Investigations of the relation between physical defects and school retardation have been made in at least three cities—New York, Philadelphia, and Camden, N. J. On the whole, according to Dr. Cornell, children with physical defects, in each school and in each study, stand lower than healthy children. Dr. Newmeyer, of Philadelphia, found among 5005 children that those with skin diseases showed poorer school ability than the healthy children. This was probably a reflection of poor home conditions. Superintendent Bryan, of Camden, N. J., examined 10,130 children, of whom 2020 were retarded, and showed that defects of hearing and vision seemed to play but a small part in the retardation. In fact, a later investigation in the same place affecting 1852 children, 573 of whom were retarded, gave the surprising information that the children of normal grade-standing suffered a higher percentage of defective vision and hearing than the retarded ones. This result was borne out by the New York investigation covering 20,000 children, of whom 1524 were backward.

In general, it can be said that children suffering from physical defects make 8.8 per cent. less progress than others. Those suffering from enlarged glands and adenoids are retarded most. Hypertrophied faucial tonsils, defective breathing, and defective teeth are somewhat less serious in their effects. Poor hearing and poor eyesight do not seem to affect grade-standing. The reasons for this are numerous; one being the importance attached to these senses by the teacher and her special care for such children.[1]

Such investigations are illuminating. First, they show the essential cruelty of the unscientific resort to the ever-ready rod. Secondly, they open a new field of valuable service to the physician. It brings him closer in touch with activities of life heretofore thought to be remote from his province. It makes the teacher his natural co-partner. It enhances his already large and vital importance to the community, and makes his function prophylactic by reducing ignorance, truancy, vagrancy, crime, pauperism, and poverty. All of this increased utility comes through the establishment of a clinic aiming to treat children's school difficulties by their causes.

Yet another portion of the function of the Psychological Clinic deals with the mentally retarded child who is permanently or incurably retarded. To all appearance—as far as clinical pictures and symptom-complexes go—this child may be like his brother retarded on account of removable physical defects. Heredity, however, playing through his parents upon him, and through him upon his children, marks him off as fatally different in so-called "unit characters" from his more fortunate partner. To distinguish between the two kinds of retardation is vital, fraught as it is with the gravest consequences to the individual affected and to society as a whole.

Possibly a few figures will serve to impress the enormity of the situation upon our minds. Estimates for the United States place the number of feeble-minded anywhere from 150,000 to 300,000. The Royal Commission of 1904 calculated 3.28 feeble-minded among every 1000 people in the British Isles. This fairly carefully calculated average, applied to 100,000,000 people in America, would give 328,000 defectives.

Still, the worst of the situation is not revealed in the mere state-

[1] For a fuller description see Laggards in Our Schools, Leonard P. Ayers, 1909.

ment of figures. Of these 300,000 defectives, according to the United States Educational Commissioner's Report, only about 20,000 are in State institutions and about another 1000 in private schools. Yet all the State institutions are crowded and have long waiting lists. In Pennsylvania alone we have about 12,000, with 3000 in institutions. Where are the rest?

One estimate places 150,000 of them in the public schools, where they ought not to be, and the remainder are at home, at work, tramping about the country, begging, stealing, filling 80 per cent. of the ranks of prostitutes, doing their own sweet will, far more sinned against than sinning, and unconsciously revenging themselves upon society by committing nearly every crime in the calendar.

The first great need with this class is to differentiate its individuals from others, especially from the temporarily retarded, by proper diagnosis and classification. This alone would go far toward eliminating feeble-mindedness from society. For it would, by the stamp it puts upon such unfortunates, prevent them from marrying and producing their kind. Further, it would bring sharply before the public the number of these unfortunates and raise such a clamor for their segregation that a tardy State would be compelled, in the name of mere humanity, to make some provision for their welfare, and protect normal citizens from their vices and crimes. How many criminals are feeble-minded is unknown, but every guess made by experts is startling in its magnitude.

So far I have indicated the office performed by a Psychologic Clinic for two great classes of mental deviates. Practically the same office is performed for the two great classes of moral deviates, the temporarily bad and the permanently bad, or moral imbeciles. The discussion of their treatment, if at all detailed, would require an article by itself.

We will now turn for a moment to observe how the Clinic does its work and why, and in what sense it is an inter-clinic.

To describe the operation of the Clinic, we had better follow a concrete case. Tommy Jones comes with his mother. Immediately the oral examination begins. The first answer shows he is backward at school, and the circumstances are such as to indicate that the cause lies somewhere in himself. Questions about his pedagogical history, his life-history, family history back to grandparents and

Fig. 1.

Training the thermal sense. Washing the hands first in warm water, then rinsing them in cold.

Fig. 2.

Training the tactile sense. Matching stuffs. She has been given a piece of velvet and has found its duplicate while blindfolded.

Fig. 3.

Learning form by tracing with the forefinger the outline and then finding the space into which it fits.

Fig. 4.

Gaining control of pencil and co-ordination of muscle necessary for writing by filling in geometric forms with crayon.

Fig. 5.

Learning to associate the form of a letter with its sound by feeling the sandpaper letter "a" while she gives its sound. She has formed "mama" with cut-out letters.

Fig. 6.

Training the basic sense. Discriminating between blocks of different weight. She is placing all the heavy blocks in one box and the light ones in another.

through collateral branches reveal no diseases with sinister sequelæ and no bad family history.

Then the boy is turned over to the medical attendant of the Clinic, who makes extensive anthropometric and medical examinations. This is for two purposes: to discover the presence of stigmata arguing permanent mental retardation, and to discover removable physical defects indicating the possibility of temporary retardation. No medical diagnosis is made. A mere suspicion of defect or disease is enough. Thereupon—and here is where the Psychological Clinic articulates with all other clinics—the child is sent to special clinics, to specialists, or to regular practitioners, as the circumstances may demand, for complete diagnosis and treatment.

This action is absolutely necessary. For, as we have said, a child suffering mental retardation from physical defects may not be distinguishable, except by hardly obtained family history, from an imbecile of high grade. Therefore, the effect of physical defects or disease must be determined by the process of elimination.

When the effect of physical obstruction to mental progress is eliminated, or can be accurately gauged, the child is given a mental examination which does two things. It determines first the degree of general mental retardation and is accomplished by giving certain pedagogical and mental tests like the Binet-Simon tasks. Secondly, it locates the mental defect in some mental process like sensation, perception, memory, imagination, or reason, and is accomplished by psychological analysis involving a physiologico-psychological laboratory and its apparatus.

In the meantime, to determine how causes outside of the child have acted upon him, how his school, home influences, and neighborhood have affected him, a sociological investigation is made. All items that may have played their part in bringing the boy to his mental or moral maladjustment are weighed.

Out of the many cases on record illustrating how a Psychological Clinic relates itself to physicians, specialists of all kinds, clinics, hospitals, homes, societies, charitable organizations, and child-welfare activities of every variety, I must limit myself to one.[2]

This is a condensed statement about S. M., Case 6. Her medical

[2] For other cases see the author's Conservation of the Child, J. B. Lippincott Co., 1912, p. 345.

experience began in school, where adenoids were diagnosed and removed at a hospital. In November, 1908, she made her appearance at the Psychological Clinic, an angelic-looking, wide-eyed, frank-faced girl, whose appearance belied in every way the tales of her moral depravity. On this we cannot pause, nor on her mental condition can we say anything. The Clinic sent her to a nose and throat specialist, who decided that her speech defect was due to nervousness. In November, 1909, she again came to the Clinic, the interim being filled with attendance at school and two weeks in a convalescent home. Her eyes were examined by an eye specialist and glasses fitted. She was kept in a boarding-house for a while. In January, 1910, she went to the Philadelphia Woman's Hospital for a second operation for adenoids, and for treatment for enuresis. Later she went to a specialist for the Wassermann test. Then she spent some time in a private home, in a children's village, then at the sea-shore where earache developed, and she received treatment from an ear specialist; then again at the village; and finally was committed to a reformatory institution, where she is to-day.

Bad heredity and bad environment were too much for this girl. In spite of eighteen months' attention, the aid of six institutions, five medical specialists and several mental specialists, several philanthropic individuals, and the expenditure of several hundreds of dollars, the girl could not be restored to society, but was at least saved from injuring herself and others as wofully as she might otherwise have done. Her case illustrates admirably the place of the Psychological Clinic that relates itself so intimately to all other clinics by attending to the whole child and yet specializes by considering only the mental and moral ills of children.

Such a position is thoroughly in harmony with the new physiological psychology which posits as its fundamental assumption a psycho-physical parallelism making body and mind merely two aspects of the same unitary substance. Practically expressed, this assumption says that body and mind are one; and what touches the body touches the mind. Of this relation, besides brain and other nervous lesions, cretinism furnishes the most striking example.

The Psychological Clinic, studying, classifying, and treating mental and moral deviations in children, by the most advanced psychological methods, must, of necessity, consider the mental, physical,

Fig. 7.

Learning color by arranging six colors with a shade and tint of each, according to their chromatic order.

Fig. 8.

Her finger is being drawn over the sandpaper letter "c" while she sounds it. In this way the muscle sense is trained to form the letter and she learns to write it almost spontaneously. She has first traced the word "cat" through cardboard on which the letters "c," "a," and "t" are cut out.

Fig. 9.

This toy appeals to the delight all children take in hammering nails. Number games are played with these blocks.

Fig. 10.

An adaptation of the Montessori apparatus. Buttoning together strips of cloth. She has laced and hooked other strips, which are on the table beside her.

Fig. 11.

At play on the lawn.

Fig. 12.

Learning to distinguish differences of form and dimension through touch as well as by sight. She has built the tower, made the broad stair, and is working on the long stair.

Fig. 13.

Getting an understanding of form by touch and sight.

Fig. 14.

Three cylinders are fitted into holes of the same size. The sense of touch, vision, and the muscles of the fingers are trained by playing with this toy.

and social aspects of its patients. Hence, it must stand at the centre of a network of organizations, and must apply to and receive aid from all the other workers for the welfare of children. Skin disease, constipation, carious teeth, thyroidism, syphilis, tuberculosis, enlarged glands, hypertrophied tonsils—all of these, as well as nervous lesions, and functional nervous disorders, act directly in causing mental and moral deviations. Therefore, regular practitioners, private specialists, and clinicists are the natural helpers to whom the psychoclinicist must turn. The Psychological Clinic is a great social lens that focuses upon the exceptional child all the scattered forces conducive to his welfare.

The illustrations (Figs. 1–14) well show a modification of the Montessori method adapted to the individuality of a girl. For permission to use these unpublished photographs, I am indebted to Miss Jean Barr, of Swarthmore, Pa.

Surgery

REPORT OF TEN CASES OPERATED UPON FOR POTT'S DISEASE OF THE SPINE BY ALBEE'S METHOD OF BONE GRAFTING

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To an American belongs the honor of first suggesting a surgical method in the treatment of tubercular caries of the spine, and to an American also belongs the honor of perfecting the surgical measures thus used. Dr. B. E. Hadra,[1] of Galveston, Texas, in 1891, first advocated wiring the spinous processes of the diseased vertebræ together to secure fixation and posterior leverage of the spine. He had successfully performed this operation in a case of fractured spine, and, considering the mechanics of this condition similar to those in tubercular caries, he recommended the same procedure. Chipault, in 1895, and Calot, in 1896, both reported having used this method of fixation successfully after forcible correction of the deformed spine. They also combined with it the fusion of the laminæ by appropriate means so as to render the fixation more complete. Lange,[2] of Munich, in 1902, essayed the burial of steel wires on each side of the spines, anchoring them at each end by silver wires, but after a few months they worked their way through the skin and had to be removed. In 1908, after extensive experiments, he again buried two steel wires, heavily plated with tin and with the ends protected by rounded knobs, alongside the spines, and they remained in position, affording sufficient support to enable the patient to do away with all brace or other external appliance and to assist in his father's blacksmith shop.

The objection to this form of operation, however, is a serious one, in that the object buried will always remain a foreign substance and cannot amalgamate with the tissues. Furthermore, any

[1] Trans. Amer. Orth. Assoc., 1891.

[2] *Amer. Jour. Orth. Surg.*, November, 1910.

Fig. 1.

Case 1, after the removal of the Taylor brace seen in Fig. 2. The earlier cases were operated upon by a straight incision over the tips of the spinous processes.

Fig. 2.

Case 1. The Taylor brace applied. Note in both illustrations the absence of deformity.

metal substance will cut through tissues, bony or otherwise, if strain is placed upon it, and, unless fusion of the bony parts has occurred, the attempts at support will fail.

In 1911, Hibbs and Albee each recorded independently operations to produce fusion of the vertebral arches. The former [3] still follows his method of utilizing the spines and laminæ for purposes of amalgamation, and with excellent results, both as to the mechanical features and as to marked lessening of the kyphosis. Albee very early abandoned the fusion operation and took up bone-grafting. The results have been remarkably successful, and his latest report [4] gives the results as little short of ideal. The technic of the operation is as follows:

The patient is placed prone, the head and shoulders being slightly elevated. A curved incision is made through the skin at one side of the spine and a flap is turned back to expose the tips of the spinous processes. The incision is of sufficient length to include one or two vertebræ above and below the diseased ones. Each spine is then split vertically, with a chisel and mallet, to the depth of about three-fourths of an inch (in the adult), and the split portion is broken over to the same side of each spine. It is not necessary to make the cut directly through the centre of the spines, as the purpose is to have bony contact, and this can be secured by taking off a fairly thin shell of bone. The interspinous ligaments are then split and the small cuts turned into one long wedge-shaped incision. This is then measured with a probe or wire to determine the length of graft to be removed from the tibia. The incision is packed with gauze soaked in hot salt solution and covered until the bone-graft is secured. The leg is now flexed upon the thigh. An incision is made over the anterior surface of the tibia for the desired length, and the fascia and connective tissue carefully removed from the periosteum over the anterior and external tibial surfaces. The length of the graft is determined from the probe measure, and the wedge-shaped graft removed by means of an electric saw, Gigli saw, or a chisel and mallet. The graft should be about one-third inch thick at its base and should taper to an edge, the width being determined by the depth of the incision in the spine. There should be medullary tissue on one side and periosteum on the other. This

[3] *Annals of Surg.*, May, 1912.

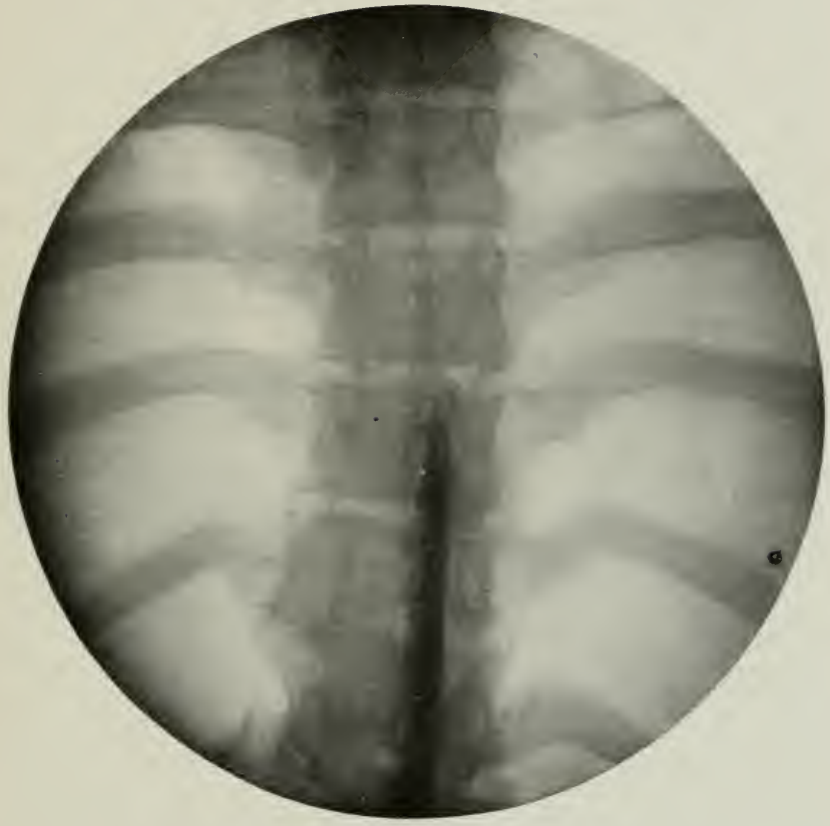
[4] *N. Y. Post-Grad.*, November, 1912.

is now fitted to the unbroken spines, cutting out portions of the graft where necessary. If there is much of a kyphos, numerous saw-cuts are made into the thin edge for a varying depth so that the graft may be bent to the convex shape. Several cuts are made with a knife at intervals through the periosteum to assist in freeing the osteoblastic cells. The graft is placed in position and the interspinous ligaments are sewn together over it by kangaroo tendon and the incision closed. The patient may then be put in plaster of Paris, or a brace may be applied, or he may be placed on a Bradford frame. The supine position is maintained for from five to twelve weeks, according to the type of the case and the rapidity of progress toward recovery. At the expiration of this time he is allowed to sit up, and very soon afterward to begin walking. At the end of three to five months Albee removes the cast or brace and allows the patient to go about without any restraint. I have not felt quite the same degree of confidence as to the solidity of the union of the graft, and have kept up fixation for a period of at least six months. The patient's own sense of security in the fixidity of the spine may be safely used as a guide to the removal of external support.

In all of my cases I have first used plaster of Paris, and have followed it in most cases with a simple Taylor brace. The following cases show the typical course of the postoperative behavior:

Case 1.—J. S., aged 23 years, a machinist. His health as a child was always good. His father died at 48 of apoplexy. His mother died at 46 of paralysis (apoplectic?). On August 24, 1911, while riding his bicycle, he was struck by an automobile and his spine was injured. He was taken to the Episcopal Hospital, where for two days he was unable to move arms or legs. He did not at any time lose control of the bowels or bladder. He suffered from pain in the back and about the chest walls. He remained in the hospital for a week, then was taken home, still unable to walk and suffering constant pain. About four weeks after the injury he first noticed a small knuckle in the spine at the tenth dorsal vertebra. He had begun to walk about and had had no support applied at any time. In December, 1911, I first saw him and noted the knuckle at the tenth dorsal vertebra, marked rigidity of the back muscles, elevated shoulders, and inability to maintain the upright position. He complained greatly of pain about both sides of the body below the site of the knuckle. A firm spinal brace with axillary crutches was at once applied, and afforded relief for about five months. Pain again became marked. A short stay at the seashore gave temporary relief, but he began to lose weight and was distinctly worse. He entered the Methodist Hospital on June 13, 1912, and on the 18th I transplanted a graft six and a half inches long from the left tibia to the

Fig. 3.



Case 1. An X-ray photograph showing the graft in position and amalgamated with the spines six months after operation. The alteration of the vertebræ because of disease is also clearly shown. (Skiagraph by Dr. George E. Pfahler.)

FIG. 4.

Case 4. This incision included the first two sacral spines. The posture is typical of lumbar (lower) or lumbo-sacral involvement.

Fig. 5.

Case 4. Illustrating the slight degree of deformity present since operation.

Fig. 6.

Case 5. The incision over the tibia for a seven-inch graft.

spine, amalgamating the spines between the eighth dorsal and the first lumbar (Fig. 1). A plaster jacket was applied and he was kept flat on his back for six weeks, and then gradually began to walk about. He suffered severe pain in the tibia for a week after the operation, but it then disappeared. He left the hospital in seven weeks, wearing a plaster jacket. This was replaced after five months by a Taylor brace, and this in turn was discarded after six months (Fig. 2). He is in excellent health and able to work at light mechanical duties, though he complains of fatigue in his leg after being on it all day. A von Pirquet test was positive, and this led me to feel that the spinal lesion was of the tubercular type (Fig. 3).

Case 2.—E. F., aged 37 years. Family history good. Both parents living and well. An only child. As a child, she had measles and two attacks of diphtheria; otherwise, her childhood was healthy. Thinks she had typhoid fever (mild attack) six or seven months prior to the onset of her present trouble. Her present trouble first began in February, 1908, after a fall. While working in a hospital she was thrown by a patient. She continued her work, but had pain in her back for four succeeding days, and then was forced to go to bed and lie flat on her back for six weeks. After this she was treated at various institutions and by various men for over a year, when her condition was diagnosed at the Massachusetts General Hospital as Pott's disease. She was quite weak, but had gained in weight while at rest. She was first seen by me at the Orthopædic Dispensary of the Methodist Hospital on September 14, 1910, and was wearing a corset brace which failed to afford proper support. She had a knuckle at the tenth thoracic vertebra, with lordosis of the lumbar region. A plaster jacket was applied and gave much relief. Jackets were worn for about a year, when pain in the sides again recurred and she was practically unable to work. She entered the Methodist Hospital on July 10, 1912, and was kept flat on her back in bed for six days. On July 16 a bone-graft seven inches long was removed from the left tibia and transplanted to the spines of the seventh dorsal to the first lumbar vertebra. A plaster cast was then applied and she was kept on her back in bed. Her temperature rose to 100° on the two succeeding days, but was normal ever afterward. Stitches were removed in ten days, a new jacket was applied in two weeks, and she began to sit up after six weeks. She has had absolutely no return of the pain, and in October she began working in a position requiring a great deal of walking and long hours at work, but has never had the slightest discomfort either in the spine or in the leg. This patient also gave a positive von Pirquet reaction. She has gained in weight and health, and in six months was relieved of all external support.

Case 3.—This patient was seen with Dr. J. J. Gilbride at the Medico-Chirurgical Hospital, and the history is as follows: J. O'D., aged 25 years, an iron worker. Previous history of excellent health. Present trouble began about a year ago, after a fall from a building in course of construction. He sustained a fracture of the right clavicle and contusions of the right thorax and abdomen. Shortly after the injury pain began along the right inferior costal margin. This pain has remained constant, running from the spine to the anterior part of the upper abdomen. It was acute at times, and was somewhat relieved by pressure over the area of location. He entered the Medico-Chirurgical Hospital on July 7, 1912, under the service of Dr. Laplace, and was examined and cared for by Dr. Gilbride. He presented a kyphosis involving the seventh to the tenth dorsal vertebra, and had also a slight lateral curvature in this region. Pres-

sure over these vertebræ caused increase of pain, referred around the lower chest wall and upper abdomen. I first saw him with Dr. Gilbride on August 22 and found all the clinical features of dorsal caries. The X-ray also showed involvement of the bodies of the seventh, eighth, and ninth vertebræ. On August 28 I assisted Dr. Gilbride in the transplantation of a seven-inch graft from the right tibia to the spines of the fifth to the eleventh dorsal vertebra. Plaster of Paris was applied afterward and the patient was kept supine in bed for six weeks and sent to his home, some distance up the State, at the end of eight weeks. His pain disappeared within a week after operation, and his improvement has been progressing gradually ever since. A light brace was applied at the end of five months, to be worn for a few months and then discarded.

Case 4.—A. W., aged 19 years. She had an excellent family history and had enjoyed good health until twelve years of age. At this time, while attending school, she first noticed an aching pain in the pelvis and legs. She was not able to play freely like other children, and the functions of the spine became gradually impaired, until, after three years, she noticed a lump located in the lower lumbar spine. Her hips became somewhat uneven. She was treated for "nervousness" at —— hospital, but was not relieved in any way. Nothing further was done until in March, 1912, when she was first referred to the Orthopædic Dispensary of the Methodist Hospital by Dr. L. Chodoff. The lumbar deformity was quite marked and the pain was constant. There was also slight weakness of the legs and increased reflexes. A brace was applied with some relief, but the pain would not entirely disappear. In June it became worse and operation was advised. She entered the Methodist Hospital on August 24, 1912, and was kept supine for ten days. On September 3, a six-inch bone-graft was transferred from the right tibia to the lower four lumbar and the first two sacral spines (Fig. 4). A plaster jacket was applied and the usual after-treatment was followed. The temperature rose to 100° for two days after operation and then remained normal. After six weeks she was allowed to get up, and was discharged from the hospital at the end of seven weeks (Fig. 5). The pains in the legs disappeared directly after operation and have not returned. All support will be removed after eight months, and, from the present indications, she will be entirely cured. Her general condition is excellent and her reflexes are normal. [On January 29, when in the act of sitting down, she felt something give way in the spine and says she heard a distinct snap. A small kyphos appeared about the middle of the graft (4th lumbar vertebra). An X-ray did not show any break in the graft, but it has evidently bended forward. She was placed at once in plaster of Paris and will be kept on her back for six to eight weeks to allow firm union to occur.]

Case 5.—F. C., aged 33 years, a carpenter. His family history is excellent. Early history good. He had an attack of pleurisy in 1907, but no after-effects. In 1911 his back was struck by a heavy beam. Discoloration and soreness across the mid-dorsal region were marked, and pain was present, radiating around both sides. The pain grew gradually worse, and was much aggravated by the jarring of stepping down. He was treated for rheumatism, and later, in —— hospital, after an X-ray had been taken, his trouble was diagnosed as scoliosis, and massage and exercises were prescribed. His symptoms increased, and when I first saw him in April, 1912, at the Orthopædic Dispensary of the Methodist Hospital, the diagnosis of Pott's disease, with marked lateral deviation of the spine, was easily made and a brace was ordered. A moderately-

Fig. 7.

Case 5. The upper and lower ends of the graft can be here seen. At about the middle of the incision is a slight prominence caused by the tip of the kyphosis.

Fig. 8.

Case 5. The patient was turned a little too much, but no deformity is to be seen laterally.

Fig. 9.

Case 5. The type of jacket applied after operation and before the Taylor brace. The bandages hanging at the sides are "scratchers."

Fig. 10.

Case 6. The cast with an opening over the incision has just been removed and the graft stands out more prominently than in the other cases. The spot near the upper end is the infected stitch wound.

Fig. 11.

Case 6. This also shows the elevated ridge of spine. The tissues in this patient are extremely soft and atrophied, and any pressure applied for even a short time makes a marked depression. The spine is nearly straight.

sized knuckle was present, involving the ninth and tenth thoracic vertebræ, and he complained of constant pain in the chest walls and upper abdomen. The von Pirquet test was positive. He received but little relief from the brace, and on August 29 he entered the hospital, and was operated upon on September 5 (Figs. 6 and 7). He had a slight elevation of temperature, with some irritation of the lungs, for a week following the operation, but nothing further developed, and he began to sit up after six weeks. He wore a plaster jacket all this time, and left the hospital on October 19 (Fig. 8). Two weeks later the jacket was changed, and when raising him up he had a sudden severe pain in his left chest wall, which could only be controlled by the supine position. The new jacket was applied, but he was unable to walk about for nearly a week (Fig. 9). The pain gradually subsided and he gained strength daily. The jacket was replaced by a Taylor brace on December 19, 1912, with entire comfort to him.

Case 6.—Mrs. E. W., aged 54 years, a school teacher. Family history good. She had the ordinary diseases of childhood, and after diphtheria at 18 years of age she had paralysis affecting various portions of the body, but finally recovered entirely. At 32 she had a severe fall on the ice, alighting on the end of her spine, and was nearly helpless for two weeks, but seemed to make a good recovery. She had two attacks of lumbago since this time, but they were not of long duration. She first came to the Methodist Hospital in March, 1912, complaining of pain and stiffness in the spine. She could not lift anything except by placing her hand on her knee for support. She was somewhat emaciated and extremely nervous. She had had pain in one hip for a time a year previous, but that had disappeared. She had a slight lateral deviation of the lower dorsal and lumbar spine, with prominence of the sacrum and lordosis of the lower lumbar vertebræ. A diagnosis of spondylolisthesis was made because of the marked prominence (per rectal examination) of the upper edge of the sacrum and the last lumbar vertebra. Pain was rather more marked in this region than in other portions of the spine. A brace was applied for support and she began to mend. She left the hospital on June 20, 1912, and continued to improve until in August, when she wrenched her back. She was readmitted to the hospital on about September 1. At this time she had a slight posterior curve in the lumbar region, and the diagnosis of Pott's disease was made and operation advised. This was performed on September 21, a graft being removed from the left tibia and placed along the spines of the first sacral and five lumbar vertebræ (Fig. 10). At the time of operation, however, it was discovered that there was a marked softening of the bone structures, and a condition of osteoporosis was present. The diagnosis of senile osteitis or osteitis deformans affecting chiefly the spine was evidently the correct one. It was also thought that as nature endeavors to fix the spine in these cases we would be justified in doing the same, and that relief should follow such fixation. A slight stitch infection in one spot took place, but no other complication (Fig. 11). Her recovery has been very slow and tedious because of her extremely nervous disposition, and she did not begin to sit up until after eight weeks. She has had no further pain in the spine, however, and the present improvement leads us to feel that she will make a good recovery. She left the hospital in February, 1913, and was able to walk about the hospital with comfort and ease. She is still wearing a spinal brace.

Case 7.—F. T., aged 24 years, a laborer. His father died of pneumonia. His mother, two brothers, and a sister are living and well. As a boy and

youth his health was excellent. In October, 1911, pain began in his lower back, and he found it difficult to bend in any direction. He continued at his work as a laborer, but grew gradually worse until in January he suffered so severely that he was forced to give up. He was treated by numerous physicians without results, and in August went to the Pennsylvania Hospital, where an X-ray was taken. A diagnosis of Pott's disease was made, and he was sent to the Philadelphia Hospital. He remained there for five weeks and was then discharged. He came to the Methodist Hospital on September 18 and was admitted the same day. Examination showed a small kyphos involving the tenth and eleventh dorsal vertebræ. He complained of pain in the lower abdomen, and the spine was quite rigid. On September 21 a seven-inch graft was transplanted from the left tibia to the affected region of the spine (Figs. 12 and 13). A plaster jacket was applied and he was recovering nicely, though he proved a very stubborn and disagreeable patient. At the end of four weeks he became involved in a fight with another patient and jumped out of bed to get something to throw. He evidently alighted heavily on his left leg and fell to the floor, groaning and complaining of the pain in that part. He was put to bed and the part examined, but nothing was found wrong until a week later. The pain still continuing, an X-ray was made and an incomplete fracture of the robbed tibia was found (Fig. 14). A plaster splint was applied and he made an uneventful recovery from this and left the hospital on December 20, five weeks after the fracture occurred, walking as well as ever. He was still wearing his plaster jacket. A week later he returned to the dispensary, and in climbing the steps he stumbled and refractured the tibia at the same place (Fig. 15). A plaster splint was applied, and at the end of January union was firm. At this time examination of the spine showed a small edge of the graft protruding from the upper end of the wound, but uninfected. It was removed with bone-cutters and no further trouble ensued. Our experience with this patient led us to believe that he caused this slight complication by some overt act after leaving the hospital, as he had proved to be one of the worst patients we ever had in the institution.

Case 8.—Mrs. I. B., aged 28 years, colored, a housewife. No family history of tuberculosis, and early history is negative. At 12 years of age, she began to have pain in her lower back and left hip. It was intermittent in character, but was not disabling. For the past five years this pain has been more or less constant, and she has been treated for rheumatism. She has always maintained herself erect, but for a year has been unable to bend freely in any direction. She is a robust-looking and well-nourished woman. On June 1, 1912, her back suddenly gave way and she became bent forward from the lumbar region, and has been unable to straighten herself since then. She was eight months pregnant at this time, and was incapacitated for all household duties. Her baby was born on July 11, and her labor and puerperium were normal, but she was compelled to remain in bed and found her legs growing constantly weaker. I first saw her with her physician, Dr. William Carroll, on October 15, and found a kyphos of the second and third lumbar vertebræ, with typical symptoms of caries of the bodies. She was taken to the Methodist Hospital the next day, and on the 17th I transplanted a six and one-half inch graft from her right tibia to the lumbar spines (Fig. 16). She was placed in a plaster jacket, the portions over her breasts being cut out to permit the nursing of her three-month-old baby. This she began to do on the following day, and has continued ever since. Her recovery was uneventful, and she left the hospital on December 11, still wearing the

Fig. 12.

Case 7. Good union was secured here in spite of the patient's unruliness. In less than a week after the operation, in a fit of temper, he rolled himself out of bed to the floor, but no injury resulted.

Fig. 13.

Case 7. There is a slight amount of kyphosis present, although in standing the patient is quite erect.

FIG. 14.

Case 7. Shows the incomplete fracture of the tibia. The line of fracture extends upward along the fibular border of the tibia for nearly two inches. The tibia is also bent away from the fibular as a result of the fracture.

Fig. 15.

Case 7. Skiagraph made by Dr. M. F. Percival, showing callus thrown out about fracture of six weeks' standing and line of fracture through callus from fall sustained on the day before the picture was taken. The extent of the graft is also clearly seen.

Fig. 16.

Case 8. In this colored subject the line of incision is nearly obliterated.

Fig. 17.

Case 8. The deformity is entirely obliterated, although she had been acutely bent forward.

jacket (Fig. 17). She has already (December 18, 1912) begun to do light household duties. In January, 1913, an attack of pneumonia of the left lung kept her confined to her bed for three weeks or more, but did not seem to interfere with her spine in any way.

Case 9.—P. D., aged 5 years. Family history free of tuberculosis. Parents living and well, and a brother and sister are in good health. He was an anæmic baby, but healthy. Had measles at 14 months, walked at 18 months, and had a severe fall downstairs at 19 months. He cried a great deal (sharp cries) after his fall, but presented no other signs of trouble until 27 months of age, when the right leg became drawn up. Three months later a decided curvature (posterior) of the spine was noted, and an X-ray made at the University of Pennsylvania Hospital showed caries of the lumbar vertebræ. Plaster casts were applied for several months, but with little relief. He was then placed upon a Bradford frame in the Presbyterian Hospital with much benefit. He later wore a brace for about nine months, but began to grow worse and was again placed on the Bradford frame. He did not improve much this time, and an attack of pertussis in February, 1912, proved very severe for him. After recovery from this he wore his brace until in September, when I first saw him. At this time he had a large psoas abscess on the right side and a marked kyphosis in the dorsolumbar region. He was admitted to the Methodist Hospital on September 9, 1912, and was placed upon a Bradford frame, bent to make extension of the spine. The angle of the frame was gradually increased to nearly sixty degrees, and he was kept in this position until November 30. The psoas abscess was opened on September 10 and closed without drainage, but it reopened within a week and discharged slightly until after the spinal operation, which was done on November 30. A graft 4½ inches long was removed from the left tibia and placed along the split spines of the twelfth dorsal to the fourth lumbar vertebra. It was easily fitted into place, the incisions closed, and a plaster trough was fitted over his back and held firmly in place by a bandage. His back healed kindly, excepting at the upper end of the incision a small stitch abscess formed, but this gave no trouble. The sinuses from his psoas abscess became occluded after operation, and he developed a septic temperature until free drainage was established. Recovery has been very slow, but at present (February 1, 1913) is proceeding satisfactorily.

Case 10.—F. W., aged 31 years. Negative family history. Patient states that at four years of age he had a severe fall, and within a few months a small knuckle was noticed in the lower lumbar region. About this time, also, he had an attack of typhoid fever which left him blind for 18 months. After recovering from the typhoid, plaster jackets were applied to the spine, and finally a brace was put on. This was laid aside at 8 years of age. He attended school from 9 to 14 years of age, and then began to work in a carpet mill. He had a fairly well-marked kyphosis at this time, but worked for six years at weaving and had good health. In 1901 pain began in the lower abdomen, with attacks of vomiting and gradual loss of sensation and motion in his legs. For the next year and a half he was treated in the Philadelphia Orthopædic Hospital and recovered the use of the parts. A brace was again applied, and he was relatively free from pain and weakness until in August, 1904, when paralysis again returned. In 1902 he also had a large ischiorectal abscess which was opened several times and finally healed. From 1905 until 1910, he could get about the house on crutches but had marked spasticity of the legs. He was operated

upon for ischiorectal abscess again in 1910, and this left him with several sinuses and a urethral fistula which persist to the present time. He has control of the bowels and bladder, but has not been able to walk since his last operation, though he is able to extend and flex his legs. Dr. J. Hendrie Lloyd examined him and reported: "Patient has meningomyelitis, infectious in origin, from tubercular spondylitis in lower dorsal and lumbar region. The lumbar enlargement is somewhat involved but not destroyed. The deep reflexes (knee-jerks) are not abolished. The patient has spastic paraplegia, with active knee-jerks, some ankle-clonus, and Babinski reflexes. Anæsthesia is not marked except over the anterior part of the thighs, where it is almost absolute. There is no paralysis of the bowel or bladder. No pain. No girdle sensation. The long duration of this condition (12 years) makes the prognosis unfavorable."

After presenting the matter to the patient in this light, he begged for operation, on the ground that he would not be any better as he was, and this afforded a chance, even though remote. On December 14, therefore, I transplanted a five and one-half inch graft from his left tibia to his twelfth dorsal and upper four lumbar spines (Fig. 18). On account of the curve of the boss, I not only cut out part of the thin edge of the graft but also sawed numerous cuts in it on the same edge to allow it to be bent to the convexity (Fig. 19). The small pieces of bone cut out of the edge were placed in the medullary canal of the tibia to promote the deposit of bone. A spinal trough of plaster was moulded to his back and then firmly bandaged to his body. His recovery from operation was uneventful. A slight infection from urine took place in the lower edge of the lumbar incision, but soon healed. However, a pressure slough of skin over the most prominent part of the kyphosis took place after ten days and exposed part of the graft. It had become attached firmly to the vertebral spines, but the small portion uncovered looks as it would probably require removal. We will wait for its separation, however.

A careful study of these cases and of the results to date justifies the following conclusions:

1. The simplicity of the operation and the absence of shock recommended in cases of Pott's disease, even though the vitality be impaired.

2. Complete fixation and immobilization of the diseased spine without interference with any other function is obtained, and this in the respiratory area is of the greatest value.

3. Plaster-of-Paris jacket is the preferable form of fixation after operation, being more nearly complete than that secured by the Bradford frame or a steel brace.

4. Because of the character of union which occurs in epiphyseal ends and in irregular bones and the delay in the deposit of solid bone, fixation should be maintained for a longer time than that advocated by Albee and Hibbs.

5. At least eight months of external support should be had in the ordinary patient and a longer time in others, according to the work and disposition of the individual. In two of my cases the graft either bent or came through the skin after five and three months respectively.

6. This type of operative procedure is nearly the ideal method of treatment for Pott's disease, both from the surgical and mechanical standpoint and from the economic situation of the patient, as it enables him to become a wage-earner in one or two years instead of six or more years under the brace treatment.

Fig. 18.

Case 10. There is still considerable kyphosis. Skin is discolored from lying on it for years. The curved lateral incision may here be seen.

Fig. 19.

Case 10. The amount of kyphosis can be observed by noting the hollow between the shoulders. The stitches are still in place, but union is complete. A direct lateral view could not be obtained because the flexion of the legs prevented lying prone.

THE SURGICAL TREATMENT OF EPIGASTRIC AND UMBILICAL HERNIA COMBINED WITH LIPECTOMY IN CERTAIN CASES

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The radical cure of an umbilical hernia in an adult female, in whom this type of rupture most commonly occurs, offers the opportunity to relieve the individual of any unwieldy abdominal fat that may exist at the time of the performance of this operation. The excision of the superfluous fat facilitates the operation by the increased freedom for manipulation which is thereby obtained.

Among the causes of diastasis of the recti muscles, thereby predisposing to the development of the potential space through which the contents of the abdomen may protrude, certainly traction exerted by a great fatty apron may play a very important rôle. The discomfort caused by this abnormal fatty deposit often amounts to almost total disability. The apparent sensitiveness of these patients greatly influences the belief that operation for what on first thought would be for cosmetic reasons is justified on grounds of more scientific purpose.

Lipectomy, as a distinct surgical procedure, was first brought to the written notice of the medical profession by Dr. Howard Kelly, of Baltimore, in 1899, by the report of a single case. Wienhold, writing in the *Centralblt. f. Gynœcol.* in 1909, records his own cases and treats the question of plastic procedures upon the abdominal wall quite extensively. Coffey, in a masterly monograph on the subject of visceral ptoses and the means of correction thereof, offers suggestions for correcting faulty conformation of the abdominal wall, which really amount to reconstructions accomplished by excision of tissue, either fat alone, or the entire thickness of the ventral abdominal wall.

It is difficult to supersede nature, and no one will ever be able to

improve upon an abdominal wall, if it is intact, when the integrity of the muscle and fascial planes is concerned, by excision of the whole wall thickness, for the removal of parts thereof.

The differentiation of the original myomeric sheets, by tangential splitting and end-to-end fusion into the muscles as they normally exist in the abdominal wall, is founded upon well-conceived principles of muscle tension and contraction. When through congenital weakness, or as the distinct result of prolonged intra-abdominal pressure, separation does occur, then plastic repair having for its purpose approximation of the structures to simulate a natural anatomical state is indicated.

ANATOMICAL CONSIDERATIONS

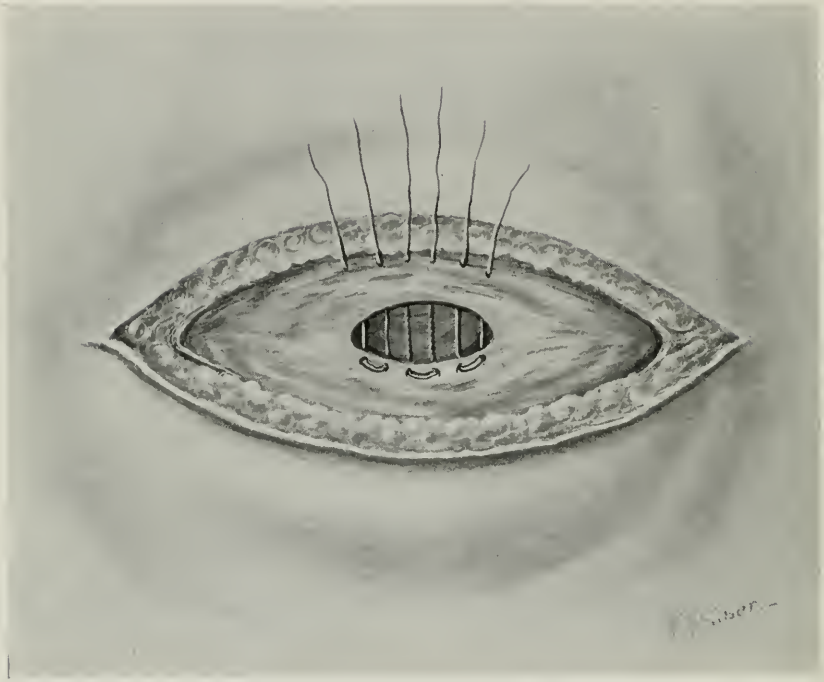
Epigastric and umbilical herniæ occur as the result of many factors. Any force which tends to affect the integrity of the abdominal wall, causing relaxation or separation either by interfering with the nerve supply or by disturbing the fascial structures which bind the muscles together, offers a predisposing cause which is scarcely secondary in importance to prolonged increased intra-abdominal pressure.

The normal separation of the recti muscles above the umbilicus is not of itself sufficient to adequately explain the occurrence of epigastric or umbilical hernia. Anatomically, the possibility of hernial protrusion should be greater below the umbilicus than above, for the following reasons: The rectus abdominis sheath is thick and above the umbilicus it is of equal strength on both the ventral and dorsal aspects of these muscles. Added thereto, there is present a greater number of lineæ transversæ in these muscles to which the sheath is so strongly adherent by fibrous trabeculæ as to make this much-segmented muscle a group of small muscles, with tendinous insertions into the sheath wall. Again, the viscus from within offering greatest pressure against the abdominal wall in the median line above the umbilicus, is either the stomach or omentum and colon, singly or collectively. The clinical proof of this fact is the observation that the almost invariable contents of the sac of an epigastric hernia is either the great omentum or colon, and sometimes both. If we examine closely the arrangement of the rectus abdominis sheath below the umbilicus, a striking change occurs in

Fig. 1.

View of the ventral wall from within, below the umbilicus. Note the presence of the obliterated hypogastric arteries and the urachus, which stands out some distance from the peritoneal surface of the abdominal wall. *U*, urachus; *H*, hypogastric artery; *B*, bladder. The median line is strengthened by the presence of the urachus within. Hernia in this line below the umbilicus practically never occurs, unless post-operative.

Fig. 2.



Introduction of mattress sutures, following removal of excess of fat and closure of the hernia sac. The sutures penetrate the sheath and peritoneum, and when tied overlap the sheath from above downward. The middle suture is linen, and the two lateral ones are No. 3 chromic catgut. (Mayo method.)

its architecture. Below the so-called semilunar fold of Douglass on the peritoneal aspect of the recti muscles, the rectus sheath is reinforced anteriorly by that lamellus which above this region constituted the posterior half of the sheath.

The presence of the two obliterated hypogastric arteries and the urachus, ascending from below, tends to act as check ligaments tral abdominal wall (Fig. 1). A study of these structures in their normal relations to the body-wall will confirm the deduction that their relations to the body-wall will confirm the deduction that their developmental occurrence here is not the only significance that attaches to them. Not content with these two anatomical factors of safety against hernial protrusion in the mid-line below the umbilical area, Nature interposes another barrier of no mean proportions against any potential weakness in the belly-wall.

The fascia of Scarpa (deep layer of the superficial fascia) is a well-marked envelope of the lower abdominal region, and by its disposition has a circumferential restraining force which is certainly one of much significance. The phylogenetic significance of this fascial structure is sufficient proof of the importance it may assume in resisting any attempt to attenuate the structures encircling the peritoneal cavity. Comparative anatomical observations upon the lower species confirm this fact—the large quadruped type, with a dependent abdomen, being a notable example.

Opposed to this normal arrangement of the structures involved in the anatomy of the lower half of the ventral abdominal wall is the fact that just here is the seat of greatest pressure from intra-abdominal causes of any sort, and yet how infrequent is hernia (excepting ventral postoperative hernia) to be found in the median line below the umbilicus.

Returning to a consideration of the causes of epigastric hernia: Three cases observed by the writer gave histories of prolonged pressure against this triangle, tending to develop a greater degree of diastasis than normally existed. Another case recently seen, presented an umbilical protrusion in addition to the large globular mass seen in the linea alba. The abdominal wall was the seat of a huge panniculus, and the dependence of this fatty mass undoubtedly was a factor in the production of the orifice in the epigastric mid-line, through which either the preperitoneal fat or the intra-abdominal

mass escaped. The history of some prolonged external force tending to separate the recti muscles in this region, giving rise to the weakness which allows the peritoneum to escape between the muscles, was quite common.

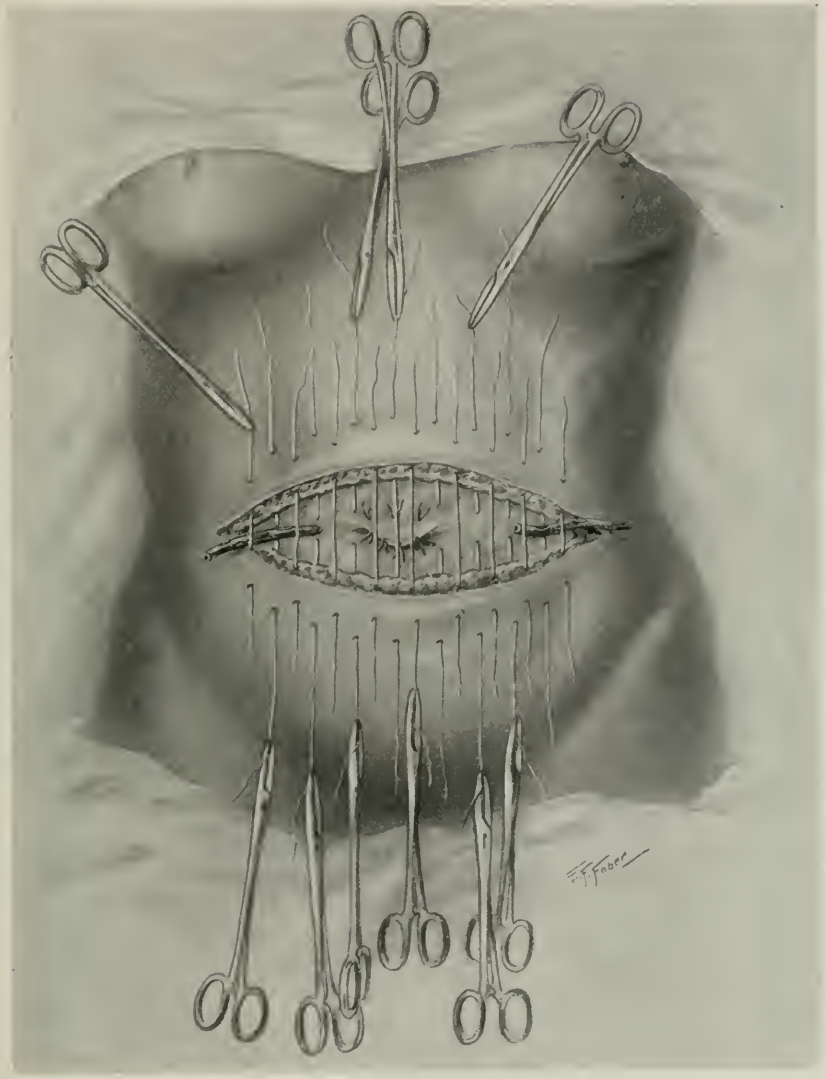
The sac of an umbilical hernia is practically always the peritoneum above the point of convergence (from within) of the urachus and the two obliterated hypogastric arteries. This area congenitally offers a developmental weakness, which in the mind of the writer is the greatest single factor contributing to the production of a hernia of this type, since it represents the last point of fusion of the ventral body-wall in its complete closure. The final contributing factor need not be increased intra-abdominal pressure, since, in one case observed, the umbilical hernia dated from the onset of the unusual abdominal wall adiposity, and the patient in question had never had any condition, intra-abdominally, which contributed to the production of the hernia. In another case a history of repeated pregnancy was elicited, and also the information that a marked increase in the size of the hernia followed the accession of much abdominal fat.

Viewing these facts in the normal anatomy of the abdominal wall and adding thereto the effects of prolonged intra-abdominal pressure, or, on the other hand, external traction by huge fatty aprons, one may readily understand how easily the small hernial orifice which potentially exists in every abdominal wall will give way to the production of a definite protrusion with its resultant complications.

SYMPTOMS

The presence of either an epigastric or an umbilical hernia may not be attended by any pain or distress in the absence of adhesions into the interior of the sac. The danger of strangulation or incarceration of any part of the gut or omentum by the constricted neck of the sac is clinically well known. In view of the discomfort produced by the adherent omentum or intestine interfering with peristalsis and the possibility of subsequent complications of a serious nature, surgical treatment should be advised, unless operation is contra-indicated by organic disease, which is often present in the aged who have borne an umbilical hernia for many years. An epigastric hernia is not always devoid of symptoms, since writers

Fig. 3.



Introduction of interrupted silkworm-gut sutures. Each alternate suture picks up the rectus sheath and latterly the aponeurosis of the external oblique muscle. The three central sutures do not pass through the hernial orifice sutured. Rubber drainage tubes in the angles of the wound withdrawn at the end of twenty-four hours.

Fig. 4.

Incision scar after six months. Transverse length of the scar is diminished by the great mass of abdominal fat still persisting. Patient weighed 243 pounds before operation for the excision of fat, and closure of an umbilical hernial orifice.

have reported the presence of gastric distress, pain of varying degree, and nausea and vomiting. The latter is not infrequently of a pernicious type.

Farrar Cobb, of Boston, has reported a case of previously unexplained diarrhœa before operation in a patient in whom, when operating for an old epigastric hernia, he found adhesions of the great omentum into the interior of the sac and to the parietal peritoneum in the region of the hernial orifice. Prompt recovery followed the relief of this condition. The writer has had a similar experience in a case in which the sole contents of the sac of an old epigastric hernia was a mass of thickened omentum, the seat of previous inflammatory changes. The patient in question was affected differently from the case reported by Cobb, since his chief distress was unrelieved vomiting. Following the immobilization of the greater curvature of the stomach by operation, relief from vomiting, which occurred after each meal and between times, was prompt.

OPERATIVE TREATMENT

Congenital umbilical hernia, unless of unusual proportions, will usually spontaneously disappear if some form of pressure pad is properly applied. Infantile umbilical hernia is far more common in the male sex in the first year of life. The increase in the female is marked after the twentieth year, because of the onset of the child-bearing period and its resultant effects upon the integrity of the abdominal wall.

Umbilical hernia offers a promise of cure by surgical means which is as permanent as the results following the various procedures for eradicating an inguinal hernia. Early operation is always advisable, because the danger of adhesion of intestine or omentum, or both, to the interior of the sac is lessened, as well as the sudden occurrence of strangulation or incarceration of the bowel.

At this time it might be well to state that the necessity for operating on children possessing umbilical hernia is not always absent, since in a certain percentage of cases a general asthenic state, combined with a congenitally enlarged colon, offers too much intra-abdominal pressure to permit the pressure pad and bandage to withstand the hernial protrusion. Since operative procedure in the young after the age of five years is one, the mortality of which is a

negligible factor, and the early and permanent recovery practically certain, it seems wiser to advocate operative treatment over treatment by bandage or truss application in those cases, previously mentioned, in whom closure is slow and uncertain owing to early postnatal weakness in the abdominal wall. Another danger in the young child is the effect of too prolonged treatment by the pressure pad. The constant application of a hard surface to the area of peritoneum lying subcutaneous is likely to set up a localized peritonitis, with the subsequent danger of adhesion of either gut or mesentery, which may be the innocent cause of unexplained vague gastro-intestinal symptoms appearing in later life.

The operative treatment of either an epigastric or an umbilical hernia should be by a method which makes a permanent and strong fascial wall, inhibiting the escape of the peritoneum. The overlapping of the interrectus fascia, as proposed and carried out by William J. Mayo in a large series of cases, is probably the simplest and most effective method of all the procedures proposed. It has some advantages over the method of Blake and can be performed in nearly all cases. The principal of the operation as stated by its author is to make "the sutures merely maintain the structures in apposition, while the intra-abdominal tension itself prevents displacement."

In stout individuals the operation of lipectomy should be performed as a step in the technique, when indicated, since it eliminates a very important contributing factor to the former condition.

The writer has performed the joint operation in the following manner: The usual Mayo operation for closure of the hernial orifice is performed employing the overlapping method from above downward, as shown in the accompanying illustrations. The primary incision is made wide of the area of the hernia, and outlines the extent of the fatty mass to be excised preliminary to closure of the hernial orifice. Hot cloths are placed over the wound during the suturing of the rectus sheath. Instead of employing a subcuticular catgut suture for the thick, fatty layer, thereby increasing the danger of postoperative suppuration in the wound, which is often of necessity of great length and depth, interrupted silkworm-gut sutures are employed in the following manner: The suture of silkworm gut penetrates the skin and entire thickness of the fatty layer, emerging

on its under surface where this layer and the aponeurosis meet. The aponeurosis or rectus sheath is then picked up in the suture by taking a broad bite, and the opposite side of the wound is penetrated by the suture, which finally emerges from the skin. Employing interrupted sutures in this way, and not including the fascial orifice, sutured in the grasp of the sutures, one can dispense with a subcuticular catgut suture and the dangers attendant upon its use. Before final closure of the wound is performed, two small sequestrated rubber tubes are introduced for some distance at each angle of the wound. These provide an adequate path for postoperative discharge, and are withdrawn at the end of twenty-four hours. Complete skin closure is facilitated by employing additional interrupted silkworm-gut sutures penetrating the skin and part thickness of the subcutaneous fat, as depicted in the illustrations. This method of suturing the wound will completely obliterate all the dead spaces and adequately preserve apposition of the wound edges. In one case, operated upon by the writer, an infected subcuticular catgut suture caused prolonged suppuration in the wound which necessitated the withdrawal of the offending catgut strand. Prompt healing then followed. (Figs. 2 to 4.)

The amount of fat to be excised is dependent upon the judgment of the operator, and it is better in the beginning to make an insufficient denudation incision than to carry the transverse cut too far above or below the umbilicus.

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TRANSPLANTATION OF TISSUES *

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GENTLEMEN: Let me depart from the practice usual on similar occasions, and, instead of reviewing the work and progress of the dying year, devote the allotted time to an individual topic, which, to me at least, appears a live and growing one. I refer to the transplantation of tissue or tissues, simple or complex, more or less living, lifted bodily to another part without the pedicle heretofore deemed absolutely essential to the vitality of the transplant or the success of the procedure. Improvement in aseptic technic combined with a better understanding of the essentials of growth has now made possible what but a few years ago it would have been deemed foolish to attempt.

To Reverdin and Thiersch belongs the credit, in my opinion, for first practically demonstrating the possibility of growth of tissues so transplanted; a possibility that has culminated in the present remarkable results achieved in the Yale and Rockefeller Laboratories,—" the growth of cells in vitro." This has been accomplished by planting in a plasma the cells to be grown, said plasma having been derived from homologous living sources, and maintained under conditions approximating as closely as possible those of life. In this day Dr. Harrison (Henderson's Laboratory) at Yale Laboratory and Carrel at the Rockefeller Institute have duplicated under the microscope what Reverdin and Thiersch did clinically in their skin-grafting. When done according to the best technic, Thiersch skin-grafting simply resolves itself into the preparation of a surface secreting the plasma essential to the life and growth of the transplant—living cells conveniently held together by the epidermis. In a similar manner, Reverdin, by burying minute particles of skin deep in granulation tissue, surrounded them with their essential pabulum, the plasma. Under these conditions growth frequently ensued. From such simple pioneer experiences we have slowly learned the lesson that in most instances not only a *homologous* but an *autogenous*

* President's address, delivered before the Western Surgical Assoc., December 20.

plasma is desirable. Witness the greater frequency with which success attends the use of skin-grafts from the patient's own body than from those derived even from his immediate kin.

Chief among the factors here militating against success are infective organisms, whether saprophytic or pathogenic, since they digest and destroy both the essential plasma and the transplant. As above stated, it has now been possible to demonstrate on the stage of the microscope that cells supplied with sufficient appropriate plasma, under conditions approximating those of life, will live and multiply, each retaining its own particular characteristics. This applies even to their systematic grouping—renal cells following arrangement, thyroid those of their source, heart muscle fibrils even keeping up their rhythmic beat. Given, then, the requisite conditions, any tissue may be transplanted; the difficulties increase with the vascularity rather than the complexity of structure, those structures requiring the least circulation proving the more successfully grafted.

Turning from the general to the particular, let me instance fat, a tissue made up of a delicate living reticulum, stored with an enormously disproportionate amount of fatty globules. For existence and maintenance it requires little more than plasma and asepsis under body conditions; hence it can be transplanted free, and in almost any bulk, provided these conditions be maintained.

For this reason, we may now look to see cavities in bones filled, not with Mosetig-Moorhof's plug or Beck's paste, but with pads of living fatty tissue taken from the patient, as was recently demonstrated at Garre's Clinic in Bonn; or, as the writer has several times done, deposit such fatty tissue in areas heretofore treated by Gersuny's paraffin injections, this tissue being particularly well adapted to filling out of those greater deformities not amenable to paraffin. Let me mention, as an example, the cosmetic filling out of the deformity left after a partial resection of the lower jaw. In the writer's hands this has given most gratifying results. Encouraged by the successful transplantation of this tissue, till recently considered liable to slough, the writer has stolen elsewhere from the patient an envelope of fatty fascia to protect the musculospiral nerve just released from the callus of a humeral fracture, or a nerve-trunk just sutured after resection for neurofibroma. Again, the hygroma that develops after Murphy's interposition of fatty fascia need no longer be obtained from a pedunculated flap taken from the immediate

neighborhood of the joint, often at the sacrifice of structures essential to a good result and adding a complication to the operation, but may be secured elsewhere. Indeed, for the ankylotic hip or knee the operation can be thus remarkably simplified.

While speaking of hygromata intentionally produced, special mention must be made of a graft now very generally used abroad, taken from the thigh and of appropriate size. It is composed of a mass of subcutaneous fat with fascia lata. By its use adhesions between the brain tissue and skull wall are obviated. The fragment being inserted, the fascia lata takes the place of the missing dura, to the remaining edges of which it is sutured, while its fatty surface, lying in contact with the brain, gives, should adhesions form, such a yielding attachment as to constitute a hygroma or cushion that lessens the tendency to a jacksonian epilepsy. When one sees for the first time the relatively enormous mass used to fill the space left vacant by the removal of a brain tumor (or the dissecting out of the dura and motor areas involved in focal epilepsy), the vision of a necrotic slough in a most undesirable position obtrudes itself; but after the repetition of cases, and with the testimony of many Continental surgeons, one finally realizes that under aseptic conditions almost any autogenous graft may remain viable in any other part of the donor's anatomy.

TENDONS

The Fellows of this society will recall the experimental work done twelve years or more ago by Dr. Hollister and the writer, in which they demonstrated that strips of tendinous fascia cut from the sheaths of the rectus of the dog could not only be thus transplanted, but at the same time could withstand the trauma incident to being used as living sutures. At that time microscopic slides were submitted showing sections made through such tendons, both from the lower animals and from man, obtained months or years afterward, in which their preservation was demonstrable. In the past, much chagrin has attended the most perfect aseptic implantation of tendons because of the adhesions so prone to form between the implant and the tissues with which it came in contact. Recently, Dean Lewis has shown that if a fatty fascial graft be placed above and below such tendon or tendons motion can be maintained. Similarly, tendons caught in the cicatricial tissue after a burn or an infection can again be made mobile if surrounded by a fatty envelope.

Let me again reiterate two suggestions, once before submitted to this society: *First,* that there are two or three parts of the body whence excellent material for such artificial tendon transplants can be obtained,—either from the aponeurosis of the external oblique, as has been demonstrated in autoplastic hernial work, or from the fascia lata of the thigh. From the fascia lata long, slender, and strong tendinous strips can easily be obtained suitable for replacing missing structures. The second suggestion is to make the taking of the tendinous strip a two-step operation; the first of these should be the loosening and raising of the desired fragment from its normal position, then burying it in the neighboring subcutaneous fat for a fortnight or more, thus allowing it to become healed in. After the lapse of sufficient time, the strip of tendon should be dissected out with a covering of fatty tissue adhering to it, thus obviating the introduction of separate fatty tissues, as in Lewis's method.

As illustrating the early realization that certain tissues require merely a sufficient amount of plasma to maintain their vitality, let me recall the suggestion made, and shown to be practicable, by a Scots dentist forty years ago,—the grafting of freshly-drawn human teeth in the comb of the cockerel, to be nourished there until such time as needed for reimplantation in the next appropriate case. In a similar way, before the era when Hartley and Krause recommended an osteoplastic flap, the writer began the conservation of buttons removed by the trephine in warm and sterile normal salt solution until the end of the operation, when, in aseptic cases, their replacement invariably resulted in their healing in by bony union. At that time, to obviate the tedious removal of several buttons in order to uncover the necessarily wide area, he had the instrument-maker construct a trephine of 2½ inches diameter, and had the satisfaction of learning that disks of such dimensions would likewise heal in by bony union. Indeed, Dr. J. Frank has a specimen obtained years afterward from a skull in which such a button is shown perfectly healed in over a psammoma hidden in the brain tissue immediately beneath it; this failed to be discovered at the time of operation, and later resulted in death during a focal epileptic seizure. From these experiences in the cranial vault, I believe the deduction to be justified that the temporary subperiosteal resection of a portion of the flat bones of any size or shape will be followed by proper healing in of the fragment when placed between periosteal layers. Imbued with the

conviction of the truth of this deduction, success has followed the temporary subperiosteal removal of a large frontal fragment together with the supraorbital arch and supraorbital plate while seeking access to the pituitary neighborhood. Its reposition has been attended by no untoward symptom, and with perfect cosmetic result.

These, and the many experiences of others, demonstrate that bone formerly believed to require an actual blood supply to maintain its existence does live without it, and, healing in, serves the purpose for which it has been inserted. Whether the teachings of Murphy are true,—that its cut surfaces must lie in contact with living osteogenetic elements to live, or that it is slowly replaced by new bone,—we do not know, but its use is justified by the results obtained. Hence, the applicability is infinite. The latest practical adaptation of this knowledge by Albee (who artificially strengthened the vertebral column weakened by Pott's disease by the insertion of fragments of the tibia between the spinous processes of the patient) has been the wonder and admiration of both the general and the orthopædic surgeons.

As demonstrating the extent to which this realization of the fact that not only simple but most complex structures can be grafted, a fitting climax was presented to the members of the Clinical Surgical Society by Lexer of Jena. I refer to the implantation of the human knee taken from one individual and inserted between the sawn ends of the femur and tibia of a patient just operated upon for bony ankylosis of that joint. The patient could walk without crutches, showed a good degree of motion, and, while yielding no better results than American methods have given, illustrates the potentialities, not yet exhausted, of free transplantation. Unfortunately, these heteroplastic homologous grafts have not the persistency of the autogenous transplant.

I do not propose to weary you with that other yet unwritten chapter which, beginning with the successful implantation of "cold storage" blood-vessels, bids fair to lead to triumphs in surgery which, even to have hinted at a few decades ago, would have condemned the one suggesting them as of unsound mind. Suffice it to say that if some of you, encouraged by the data just reviewed, shall find in it a stimulus to search for still better methods, newer adaptations in your future work, far-reaching benefits will accrue to humanity, to which our best efforts are ever devoted.

BILATERAL CEREBRAL ABSCESS INVOLVING THE MOTOR AREAS *

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The case which forms the basis of this paper was thought to be worthy of report for the reason that it presents an abscess in each cerebral hemisphere, the two about equal in size, and both involving motor areas to such an extent as to produce a practically complete bilateral hemiplegia. Cases of symmetrically located abscesses of large extent have no doubt occurred before, but in a fairly careful search through the literature of the subject I have been able to find only one.[1] In this case the abscesses were secondary to double otitis media, and were located in the temporosphenoidal lobes. The smaller contained three and one-half ounces of pus. They were operated upon at different times, with an interval of six months between two operations, and the surgeon had the satisfaction of seeing his patient recover with special senses and mental power intact.

As in most cases of multiple abscess of the brain, the one to be reported was embolic in origin, the infecting focus being a left-sided localized empyema communicating with a bronchus. Virchow, in 1853, first called attention to the fact that septic processes involving the thoracic organs, especially the lungs, are a fruitful source of brain abscess. According to Kektoen and Riesman,[2] about one-half of the cases are referable to this cause, and statistics are fairly uniform in ascribing about one-third of the cases to otitis media, while direct trauma is responsible for from 17 to 24 per cent., or, according to different authorities, even 50 per cent. Judging from the cases reported throughout the literature, the estimate of 25 per cent. being due to embolic processes from the thoracic cavity would seem to be rather high.

Clayton,[3] in 1901, collected from the literature 58 cases secondary to lung diseases, and found them distributed as to primary cases as follows:

* Read before the Western Surgical Association, December, 1912.

1. Bronchiectasis	20 cases
2. Empyema	10 cases
3. Purulent bronchitis	9 cases
4. Gangrene	7 cases
5. Tuberculosis	5 cases
6. Lung abscess	3 cases
7. Pneumonia	2 cases
8. Gunshot wound of lung	2 cases

The explanation for the prominent rôle played by septic lung conditions in the causation of brain abscess is, of course, to be found in the fact that emboli escaping from the radicles of the pulmonary vein pass at once into the systemic circulation, instead of having first to run the gauntlet of the pulmonary circulation, as is the case when originating elsewhere. It is a striking fact that emboli secondary to purulent lung infections have a predilection for lodgment in the brain. On the other hand, those arising from a left-sided endocarditis show a preference for the kidney or spleen rather than the brain by a ratio of six to one. No satisfactory explanation of these peculiarities has been offered, though some have been attempted.

Brain abscess due to embolus, while it may occur in any part of the organ, is most likely to be found in the course of the artery of the fissure of Sylvius. That from otitis media is usually in the temporosphenoidal lobe or the cerebellum, while that due to traumatism is most often found near the site of the injury.

The case to be reported is as follows: H. B., a young man of 18 years, and in very bad general condition, was referred on February 2, 1912, from the Medical to the Surgical Service in the University Hospital with the diagnosis of a localized left-sided pyopneumothorax communicating with a bronchus. The history and symptoms corresponded with this diagnosis, and on February 5 three inches of the eighth rib was resected, several ounces of thick, foul-smelling pus evacuated, and the cavity, which was found to involve the lung substance, was drained. Following drainage, the temperature, which had been high (102° to 103° in the evening, and subnormal in the morning), quickly dropped to normal, and the offensive expectoration, which had been very profuse, greatly diminished in amount. On February 11, six days after the drainage operation, there was vomiting of a large amount of green, watery fluid, which was repeated once or

oftener each day for a week. After the cessation of this symptom the general condition improved greatly, and the patient was up and about, still somewhat troubled by coughing, which was usually attended with only slight expectoration. The discharge from the wound was still profuse.

On February 24, 19 days after the operation, the patient had an aphasic attack characterized by a fixed stare and the repetition of the word "water" or "what." He seemed unable to form a sentence, but there was no paralysis, cyanosis, or dyspnœa. The next morning he felt "fine," as he said, but in the afternoon had a second and similar attack lasting about a minute.

On February 27, during the course of a similar attack, there was rigidity of the right hand. The diagnosis of cerebral abscess was now made. The patient lay usually with the head on the left side. On the next day he had another attack of aphasia, and appeared paralyzed on the right side. Following this he talked lucidly for a few minutes, and ate his dinner. Soon after he again became aphasic, and there was twitching of the fingers of the right hand; the arm was held stiff. Half an hour later there was a general convulsion, the whole body twitching for about four minutes, during which time he was wholly unconscious. In three hours he was much better and fully conscious. He answered questions readily, and could move the right arm and leg. On the 29th the only thing complained of was right-sided headache. The patient was bright, talked normally, and had no paralysis. The neurologist, called in consultation on the 28th, made the following notation: "The history of aphasic attacks, the convulsion of this morning, the turning of the head and eyes to the left, the right hemiparesis with recovery, the deviation of the tongue to the left, together with the history of pulmonary abscess, indicate a probable abscess or beginning breakdown in the left temporal lobe. If other conditions are favorable an exploratory operation on the left temporal and inferior parietal lobe is advised." Other conditions did not look very favorable, and operation was delayed for a few days, whereupon other symptoms developed. On March 4 the left hand felt numb. On March 5 there was jerking of the left arm lasting about five minutes, and on the next day it was paralyzed. Late in the day there was a general convulsion, more marked on the right side, and followed by paralysis of the whole body. Still later in the day the

young man could move both the left arm and leg, although subsequently the arm became paralyzed. Two days later he could again use it. Headache was often complained of, and vomiting was not infrequent. Often, too, there was involuntary urination. The temperature was subnormal much of the time, and the pulse fluctuated from 60 to 90. There was double optic neuritis.

On March 16 an osteoplastic flap was made over the motor area on the left side, and at the depth of about two centimetres an abscess containing one ounce and a half of rather thick, offensive pus was located and drained. The abscess lay beneath the ascending frontal convolution and extended downward and backward for about three centimetres.

The following day the temperature was normal and the pulse 86. The patient could move both legs and the right hand, but the left hand was paralyzed. He was unable to speak, but evidently understood what was said to him.

On the 19th the pulse suddenly jumped to 160, and, from this time until his death on the 30th, the condition of the patient was continuously critical, although the pulse at one time came down to 120. The right arm was used often for purposeful actions, but the left not at all. The right pupil was dilated.

The diagnosis of probable abscess in the motor area on the right side was made, and the advisability of a second operation on that side considered, but it was not performed on account of the bad condition of the patient and the contrary view of the consulting neurologist, who, on March 23, expressed the opinion that the unsatisfactory condition was due to an "extension of pus toward the base."

At autopsy the drained abscess cavity was found to be almost completely obliterated, only a small amount of pus being still present beside the drainage tubes. In the corresponding area on the right side was an abscess, rather larger than the original one, and apparently composed of two smaller ones that had coalesced. In the silent area in the anterior pole of the left frontal lobe near the median line was a third abscess the size of a quarter. Each abscess had a distinct limiting capsule. The meninges and the ventricles showed no involvement.

Aside from the bilateral symmetrical character of the lesion and its involvement of the motor areas, the chief interest of the case lies

in the question as to whether the left-sided paralysis could have arisen from the abscess in the left motor area.

It is well known that paralysis may result without actual destruction of any part of the motor tract. This fact is well illustrated in the case under consideration, for on each side there was marked paralysis of the arm; on the left side this cleared up and twice recurred before the final and permanently complete involvement. Symptoms of this character are due to what Krause [4] calls "neighborhood" involvement, and may be the result of pressure, œdema, circulatory changes, or of inflammatory conditions sufficiently mild to permit a return to the normal. Thus, in large abscesses of the temporosphenoidal lobe Macewen states that hemiplegia of the side opposite the lesion is sometimes observed, and that a degree of paresis would often be found if sought for. This is doubtless due to pressure transmitted to the internal capsule, which is quickly relieved after drainage of the abscess.

In a case such as that in point, however, it is difficult to conceive of an abscess producing paralysis on the same side as the lesion without extending down toward the base as far as the pons, thus involving the motor fibres of the opposite side after the crossing. Lateral ventricle or other involvement would, it would seem, almost certainly supervene and end the life of the patient before this could occur. I have found no such cases in the literature.

In this connection I may, perhaps, be permitted to mention a case of tumor which presented this pathologic paradox. The report is a personal one from a neurologist, and has not been published.[5]

The patient was a male, 38 years old, who had complained of severe headache for about a year. Double optic neuritis and bitemporal hemianopsia were present. Hemiparalysis involving the face, arm, and leg on the right side had lately developed, also sensory aphasia, but there were no motor disturbances of speech. The diagnosis was brain tumor involving the left motor area. Operation in this region revealed nothing but increased brain tension. At the autopsy an encapsulated subcortical tumor the size of a hen's egg was found in the right parietal lobe just posterior to the central convolutions. This case would seem to indicate that sufficient pressure could be caused by a tumor across the mid-line and downward to

exert its influence upon the opposite internal capsule, and thus produce paralysis on the same side as the lesion.

The unusual character of the paralysis could be accounted for by abscess in the pons, and Macewen [6] states that cases are recorded in which alternate hemiplegia, or even bilateral paralysis of the face and limbs, was due to this cause. Krause also records a case in which paralysis of the remaining side was ascribed to such an abscess, although the diagnosis was not confirmed by autopsy, as this was not permitted.

In our case, however, a review of the evidence seems to indicate that there should have been little uncertainty as to the presence of a second abscess. The embolic nature of the infection and the manner of onset of the paralysis, in retrospect at least, appear confirmatory.

Because of the high percentage of cases with more than one abscess when the lesion is secondary to a pulmonary focus, uncertainty has been expressed as to whether such cases should be subjected to operation. On the other hand, Bibrowicz [7] reports three of these cases in which the lesion could be definitely localized clinically, but operative relief was refused by the patients. In all of these cases the autopsy showed the abscess to have been solitary and readily accessible. Moreover, Krause asserts that the percentage of cases of multiple brain abscess secondary to pulmonary infection has been placed too high, and that the statistics of the last twenty years show that in 45 per cent. of the cases the abscess was solitary. In view of these figures, and the practically absolute hopelessness of the condition without surgical relief, definitely localized abscess should always be drained.

Our case differs from those of otitic origin in that the symptoms of the initial stage were marked by those of the primary condition, and there was, therefore, no suspicion of the real situation until aphasia appeared. In going back over the chart, however, it seems probable that the initial period commenced with the vomiting on February 11, six days after the drainage operation on the chest. It is impossible to say whether or not the three or four emboli responsible for the different abscesses all lodged at the same time, but this seems probable because of the fact that the capsules of all three were of about the same thickness and general appearance. The difference in time in the appearance of the symptoms of paralysis on the two

sides,—only nine days,—might be accounted for by the degree of completeness of arterial occlusion, by the several emboli, and by the rate and direction of the consequent breaking down of the brain tissue.

The case seems one of great rarity and unusual interest, but the chief conclusions to be drawn, I am compelled to confess, cast considerable reflection on its management. The first abscess should have been drained immediately after its diagnosis, in spite of the poor condition of the patient, as this could not greatly improve under the circumstances; furthermore, courage should have equalled conviction, and led to the drainage of the abscess on the right side when its presence seemed reasonably certain, even although the third abscess in the silent area of the anterior lobe held the probability of defeat in the end.

NOTE.—Directly after the reading of this paper, Dr. L. L. McArthur called my attention to similar conditions in a case reported by him several years ago. In his case the symptoms indicated a lesion on one side of the head. Operation revealed nothing, but at the autopsy the lesion was found to be on the same side as the paralysis.

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Obstetrics

THE CARE OF THE WOMAN DURING HER THIRTY-NINE WEEKS OF GESTATION *

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It is important that the accoucheur keep abreast of the times during this renaissance of surgery and medicine. There is too great a tendency to assume that as pregnancy and labor are normal physiological processes, nature should be allowed to take her course without any solicitation on the part of the doctor. We must recollect that, living in this age of unnatural straining after money, fame, and social position, the whole people are abnormal, and particularly is this true of the physically weaker—woman.

Even though the opportunities for better living pertain here in America, we must remember that many of the inhabitants of this country are only a few generations removed from European ancestors, that have lived crowded together with poor food, often in factory towns, where narrow pelvis and delayed menstruation are the rule.

Then, again, our women come of a race of corset-wearers, and until very recent times the corset was made without regard for anatomy. The consequence has been that every fifth woman suffers from visceroptosis, more or less. Not that the corset is the only or the most important cause of visceroptosis, but still it helps in its formation and it helps in the distortion of the pelvis both by direct pressure and by changing the centre of gravity.

The great variety of nations that goes to make up our country tends towards dystocia. The raw-boned, husky Swede marries a small-built French woman, or the man of the working class, coming of a generation of hard workers, with big, lusty bodies, makes his way in the world and mates with a dainty aristocrat whose ancestors have done but little physical work, and the result may be disastrous,

* Read before the Guilford Medical Society, October 3, 1912.

so far as the offspring is concerned. So we see that although there are certain things, such as more diversified food, less crowding, a broader life, here in America that tend towards developing normal labor, there are other facts that seem to predispose towards dystocia.

One of the things that interferes with the more careful looking after the prospective mother is an inherent modesty that develops in her after impregnation. She possesses this in common with many of the lower orders of life. William Morton Wheeler, in an article in the *National Geographic Magazine* of August, 1912, on "Notes about Ants and their Resemblance to Man," says: "After mating with the male high in the air, the queen descends to earth and looses her wings, either by breaking them off at the base against the stones or blades of grass or by tearing them away with her mandibles, for they are to be of no further use to her. She then seeks some small cavity under a stone or piece of bark, or digs one in the ground, and closes it after her, so that she is completely cut off from the world."

The care of the parturient woman may be, for study, grouped under the following heads: 1. To find out the exact date of her expected labor. 2. To keep her body functions in such condition that both she and the baby will benefit by the pregnancy. 3. To see that she gets the things that she will need to make her delivery safe and comfortable. 4. To know beforehand what sort of labor she is liable to have, and to interfere with the pregnancy if it is found necessary.

Spiedelberg reports Lowenhardt's estimation of the exact length of pregnancy, from conception to delivery, as 272 days; the larger number occurs in the thirty-ninth week than in the fortieth week. The same author has found that the length of time from the first day of menstruation to delivery is 282 days, while, if the counting is done from the last day of menstruation, 278 is the average. That the length of duration of the parturient period varies with different individuals, and even in the same women at different pregnancies, has been observed by us all, consequently, the estimation of the date of delivery from the menstruation is most uncertain. In order to come as near as possible to the date of delivery, I have adopted the plan of calculating 278 days forward from the last day of menstruation, taking into account the number of days in the various months through which the pregnancy will continue. In addition to

this, I warn the expectant mother of the date when she is liable to feel the first movement, expecting it to occur at the end of the fourth month in a multipara, and at the end of four and a half months in a primipara. In order that the woman will not forget, I have had made a set of instructions to pregnant women that, among other things, has a place for writing in this date of expected first movement. My set of instructions has also a space for writing in the time when I wish to make an external examination of the abdomen. I make this examination, as near as I can, when the woman has completed her sixth month of pregnancy. At that time the uterus should be almost at the navel. This examination will depend, however, upon whether the intestinal tract is empty or not, and whether the woman is standing or in the recumbent position. I examine her lying down after she has had a bowel movement.

If the date obtained from the menstruation and the time of the first fœtal movements seem to point to the same date as the external examination of the abdomen would indicate, then I feel comfortable about the date for the termination of the pregnancy. I must confess, however, that with all the care possible the date that I estimate and the date that nature seems to select are not always the same.

Professor Paul Bar, of Paris, has recently given us some very interesting and scientific information on the physiology of pregnancy. He endeavored to determine the modification in the nutrition of the healthy woman produced by a normal pregnancy, employing for that purpose the study of the urine. He found that upon a rational régime the healthy pregnant woman retained more nitrogen than one not pregnant; that the retained proteids were more than enough for the fœtus. So that, so far as nitrogen is concerned, the pregnant woman is at an advantage over her virgin sister. He states that the fœtus is not a parasite, but there is a harmonious homogeneous symbiosis between fœtus and mother. Bar found that the weight of urinary ammonia appeared to increase during pregnancy, and the relation of the nitrogen of the ammonia to the total nitrogen was above the normal. He found that the maternal organism was able to store up phosphorus; that as the fœtus draws its iron from the mother's blood, the hæmatopoetic organs, such as the liver and spleen, were sometimes somewhat overworked. A pathological cycle was met with: there was first the fœtal demand for iron,

followed by excessive hæmatolysis and its results, polycholia, the simultaneous loss of iron and sulphur by the intestines, and, finally, cholæmia. The only substance that seemed to be lost in excess of gain is lime.

Under ordinary circumstances the time of pregnancy is a real gain to the health of the mother. My own observations have shown me that there are two classes of women that are markedly in contrast during pregnancy; of these the larger number increase in weight, have bright, sparkling eyes, and have a particularly good appetite, while only a few of them look thin and show signs of failing health. The latter require iron, lime salts, and a very careful looking after of the urine. With these women I make frequent analyses of 24-hour urine, looking for the total ammonia, urea, and indican, particularly.

It is not the purpose of this paper to discuss the toxæmia of pregnancy or the other conditions that may arise to render the case serious, but rather to direct attention to certain things which, if observed, will help to make the pregnancy safer.

Seeing the woman herself and observing the way she is caring for herself, along with the frequent urinary examinations for the simpler things, such as albumin, sugar, indican, casts, and, if the symptoms warrant, a 24-hour sample examined for ammonia and urea, are, to my mind, of the most service. Along the line of urinary examinations it might be well to mention the well-known fact that sugar, as glucose or lactose, is found, according to Bar, in 10 per cent. of primiparæ and 30 per cent. of multiparæ. As a rule, it has no particular significance, except to indicate a fœtal glycogenesis and the development of fat in the fœtus.

As a matter of convenience to the women and to myself, I give each pregnant woman the printed form already mentioned. This also tells her of certain conditions that she should look out for, such as swelling of the limbs, hemorrhage, etc. Then there is a list of things that she will need at the time of delivery and during her parturient period. Her dressings I have sterilized for her.

I am very particular about abdominal and breast massage during the parturient period. Not only does abdominal massage make the woman more comfortable, but the relief to the stretched muscles will be appreciated later, when after labor the muscles more quickly

regain their tone and help to prevent visceroptosis. The hardening of the nipples with alcohol, hamamelis, and alum has, in my experience, been of much help in preventing cracked and fissured nipples. Besides, it is well for women early in pregnancy to have respect for, and their attention drawn to, the two things that in my opinion are the most important to the child-bearing mother—the breasts and the abdominal muscles. Good breast develops strong, healthy children that are not so subject to infectious diseases. Good belly muscles make straight-backed, handsome women, without constipation or backache. Attention to frequently overlooked details will tend to make the difference between misery and happiness in mother and baby.

It is possible to know beforehand many of the troubles that the pregnant woman is liable to have. If she is a multipara, the history of her first labor is liable to be repeated, though this is not necessarily the case. As an example of marked difference in labors of the same woman, I will report the following case:

Mrs. H. J. M., whose pelvic measurements were 23–29–32–20, was delivered of her first child in three hours from the first pain. The child was a girl in first vertical position, weight 9 pounds. Her second labor was twenty-five hours, when she gave birth to a 5¾-pound boy in second vertical position. Her third labor was ten hours, when she gave birth to a 9-pound boy in first vertical position. Her pains seemed to me equally severe in each delivery.

In explanation of the pelvic measurements, I wish to say that I use Leopold's plan. All of the measurements are in centimetres. The first figure is the distance from the top of the anterior superior spines of the ilium; the ends of the measuring instrument are placed on top of the bones; I try as far as possible to measure from the inside of the bone. The second figure is from the crest of the ilium, measured from the inside of the top of the bone similar to the first. The third figure is the bitrochanteric measurement. The last and most important is the distance from the symphysis to the depression underneath the last lumbar vertebra.

These measurements will be slightly smaller, because of the method of taking them, than those of the average observer. The idea in taking the measurements from the inside of the bones is to get the exact size of the inside of the pelvis. I do not make a vaginal examination of my cases except where it is absolutely necessary,

hence I have very few records of the internal distance from the promontory to the symphysis.

When we come to the actual delivery we will find that it is not the measurements of the pelvis nor yet the size of the child that makes delivery difficult, but it is the narrowing of the pelvis, the position of the child, and, most of all, the ability of the part presenting to shape and conform itself to the pelvis. But, still, in preparing ourselves for the delivery the only things we have to help us to determine the outcome are the past performances of the woman, her apparent strength and desire to do her part, the size of the child, and the size of the pelvis.

In order to help to throw some light on these points I have gotten together statistics on my last 112 cases. These cases were all in private practice. Of the number there were fourteen instrumental deliveries (I include, under instrumental deliveries, versions). The instrumental deliveries were 12.5 per cent. of the total number.

The pelvic measurements of the whole series averaged 21.1–26–31.45–19; of those delivering themselves, 22.3–26.6–31.7–19.3; of those delivered with forceps, 20.9–25.5–31.2–18.8; and of those delivered with forceps because of the inability of the head to conform to the shape of the pelvis, 21.7–25.4–31.2–18.6.

In the last class the average child was 8 pounds in weight. The smallest child weighed 7¾ pounds, the largest 9½ pounds.

It is not the purpose of this paper to enter into the different varieties of contracted pelvis and their significance, but rather to call attention again to the fact that by careful measurements of the pelvis while there is yet time we are in a position to know whether or not trouble is lying in wait for our case, and we will be able to induce labor, or send the patient to the hospital where she will have a better chance.

My rule in cases that show a contracted pelvis below 19 antero-posterior diameter, particularly if it is a rhachitic pelvis, is to warn the woman that we are expecting trouble and that the best place for her is the hospital. I find but little difficulty in persuading her to adopt this course. A little observation and care of the woman during the thirty-nine weeks of gestation will result in saving most mothers and babies.

Electrotherapeutics

GENERAL CONSIDERATIONS FOR THE SELECTION AND RATIONAL USE OF PHYSICAL AGENTS IN THE TREATMENT OF DISEASE [1]

BY MORRIS WEIL BRINKMANN, A.B., M.D.

New York City

INTRODUCTORY REMARKS

A VERY considerable space will be given in this article to the metabolic functions concerned in our choice of time for treatment, whether general or local, the physical agent employed, the intensity or quantity of dosage, and the intervals necessary or desirable between treatments. The safeguards and danger signals will be developed, it is hoped, in such a manner as to be thoroughly grasped, so that the practitioner can act with precision, with safety, and with boldness.

Physical agents may be defined as the forces of nature utilized to influence the work and life of the cells and the fluids of the body;—whether groups of cells or large masses of tissue, whether it be the processes or products of the work done in the solids of a part or the whole; or in the fluids of a part or of the whole body; physical agents being a generic term used to cover a large variety of manifestations of energy; energy being used in the physical sense and implying the use of all those precise measurements which are in daily use in the physical laboratory, as well as commercially. Before one can intelligently employ these agents there must be in the mind of the user some adequate conception of the force employed.

According to the laws of transmutation of energy, the basis of measurement employed is not of so much importance as the units

[1] This is the first of an important series of eight papers covering the entire field of medical electricity and radiant energy which will appear in the INTERNATIONAL CLINICS during the present year. The contributors to this series are well-known writers of this country and abroad, selected for their special knowledge to write upon subjects assigned to them.—EDITOR.

which transfer from one system to another by very simple methods of calculation. Let this start by the statement of the value of a horsepower. This is evolved by the force required to raise 33,000 pounds one foot in one minute. Having grasped the significance of this statement, we will restate another term of measurement, which is that one horsepower is equivalent to 746 watts. The ratio of 746 to 33,000 gives the simple method of transferring foot-pounds to watts, or, conversely, the watt being the product of electrical energy represented by the product of volts and ampères. Whether we use our energy as mechanical pressure, or as electrical current, or as light waves, or as heat or X-ray examination, or as high-frequency discharge, the total amount of energy is the true indication of the quantity employed, and for the measurement of quantity appropriate meters give absolute and standard measures, which leave nothing to be desired. There is no electrical current where we cannot establish and measure the input of energy and from this deduce the approximate output.

To those alone unacquainted with the measurements in the use of physical agents, can there be any mystery or unclearness as to the power employed. This sentence is the answer to that group of critics who state without basic knowledge that this class of agents have no other action than a psychical one. It is not alone of interest to state mathematical, concrete cases, showing the enormous amount of energy employed in certain treatments, but is a matter of necessity to the practitioner, as a warning and a guide in the use of these agents.

Let us assume that a patient is receiving a treatment from the modern type of high-frequency D'Arsonval apparatus and the input is represented by 220 volts and 8 ampères. This is equivalent to 1760 watts. Now, as 746 watts, as stated, are equivalent to one horsepower, therefore,

$$746 \overline{)\,1760\,} \quad 2 \quad \frac{268}{746} = 2\tfrac{1}{2} \text{ horsepower (approximately).}$$
$$1492$$
$$268$$

Now, $2\frac{1}{2}$ times 33,000 = 82,500 foot-pounds.

If one cannot grasp the measurement and application of the force equivalent to 82,500 foot-pounds, that mind is certainly not qualified to express opinions, and much less is it qualified to use judgment in

deciding on the value or method of action of such a tremendous amount of energy units.

Whether, as in the case of bipolar D'Arsonvalization or in the apparently impalpable manifestations from the radiating X-ray tube, again from energy radiated from some luminous source, except as the specific energy in our case, the calculations should be made in a somewhat similar manner; the practitioner will then employ these agents upon a basis of this character, he has then thrown around himself and the patient the security which will protect both against disagreeable surprise; the patient being thus shielded from annoying and possibly dangerous consequences.

The physical agents most commonly and actively in use are the different forms of energy frequently described as modalities, mainly electricity, light, heat, mechanical movement; whether this latter be vibration, massage, or exercise. We will not undertake a discussion here of the dietetic, climatological, pneumatic, etc., as physical agents.

The electrical modalities consist, primarily, of direct or galvanic current and, secondarily, of the great variety of currents derived from the direct current, such as induced or Faradic, sinusoidal of the high rate, sinusoidal of the slow rate, interrupted, galvanic or sinusoidal of the high or low rate, multiple rates of the harmonic or dissonant type; high-tension alternating currents of varying degrees of potential or voltage, as well as the varying degrees of quantity or milliamperage, high-tension or high potential unidirectional currents of low or high milliamperage. Employing these manifold forms of electrical energy as a basis, it can be readily understood that a large variety of effects can be secured in accordance with the manner in which they are employed. It is quite obvious, therefore, that before one can intelligently use these agents there must be a clear understanding of the character of the current as well as its quantity. We will, therefore, very briefly review the physical characteristics of the currents enumerated.

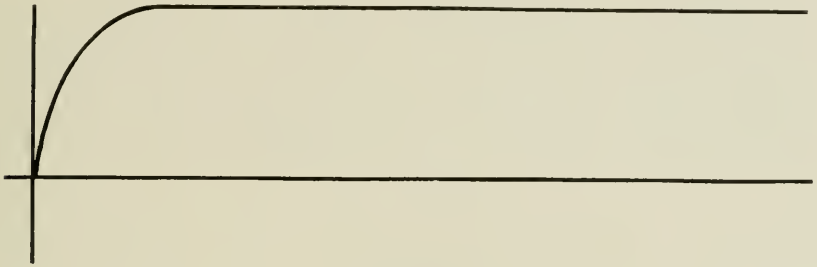
DIAGRAMS AND DESCRIPTIONS OF CURRENTS

The diagrams which follow are intended graphically to illustrate some of the forms of wave movement which we are employing in our daily work, and are, the writer believes, the first attempt made to

indicate the manifestations of energy in accordance with our physical knowledge, except the ordinary sinusoidal curve, which has been frequently shown.

Attention must be directed to the value of the base line as to time. For example, Diagram 2, where four waves are shown, might indicate a time as high as one-quarter of a second—equivalent, therefore, to

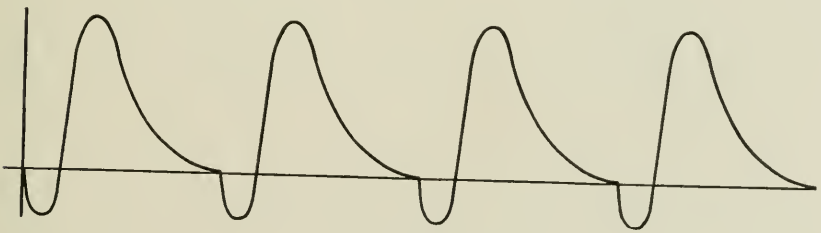
FIG. 1.



Plain galvanic.

sixteen waves per second. Whereas, the base line of Diagram 10 might indicate (it being a high-frequency wave) a time for eight waves of one fifty-millionth to one-hundred-millionth of a second. The six waves shown in Diagram 7 (sinusoidal) might occur in a time varying from one-fiftieth to one one-thousandth of a second. The diagram No. 6 is that of pitch variation, and shows only one pitch varying. Diagram 5 shows the slow variation of the Faradic current

FIG. 2.



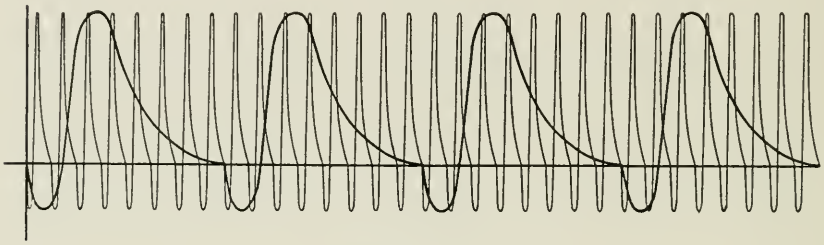
Plain faradic.

at a low pitch rate of the interrupter of the coil, and represents almost the lowest bass note of the musical register. Diagram 4 is the one commonly recognized as the sine curve, and in type represents all sinusoidalized currents, at least in outline. Diagram 3 represents the harmonic, Faradic current, which has been thoroughly described in previous papers by the writer. In the diagram shown only two ribbons of the coil are shown as operating.

The practitioner can, therefore, have a clear and comprehensive view of the nature of the electrical agent which he is employing, and there must be a clear idea of the physiological action as well.

At this point arises the consideration of that vast problem, the patient. Biologically every animated creature continues to persist

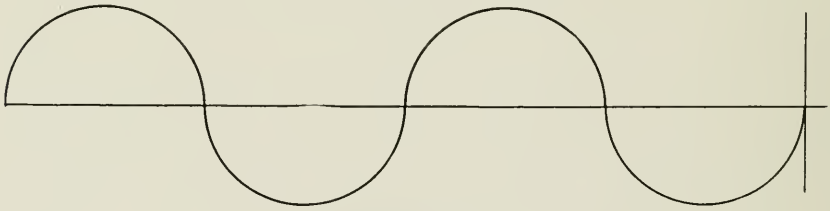
Fig. 3.



Faradic harmonics.

as a living creature through the operation of the laws of matter. The interchanges going on during life are the result of processes. Every phenomenon which is presented to our observation in a living creature is intimately connected with the laws governing both the matter of the body and the operation of the processes going on in that body. If we employ physical agents to influence either the matter of the body or the processes going on in that body, we must

Fig. 4.



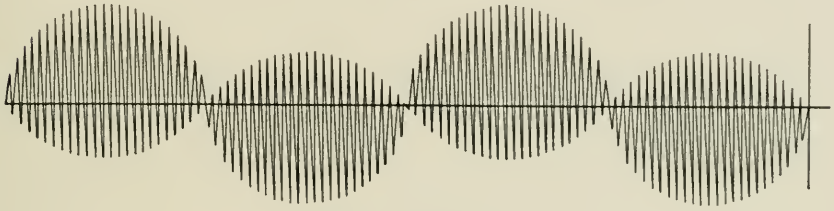
Slow galvanic sinusoidal.

be quite clear which of these we are endeavoring to attain. The study, therefore, of the processes going on in our patient is of as much importance as is our study of the use of the agents we employ.

Physiologically there exists a relation between the matter of the body and the processes going on in it. This is measurable in a variety of ways. During life the generation of heat and the production of waste proceed at a definite relative rate, which means that oxidation, heat formation, and waste production go on at some deter-

minate ratio, and, fortunately, this is measurable by very simple methods. The clinical thermometer and the measurement of waste output are absolute guides in the estimation of metabolism. When the rate of oxidation is high and the ratio of elimination is low, the temperature of the body rises; when, on the other hand, the metabolic

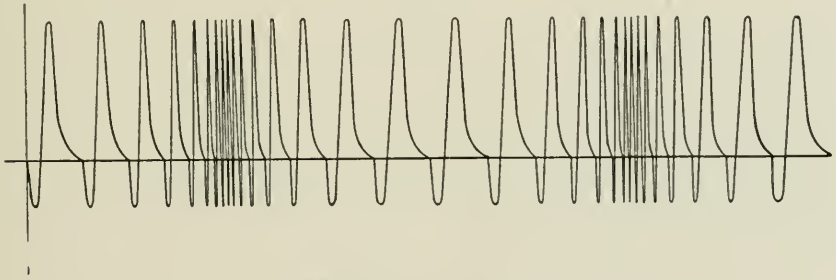
Fig. 5.



Slow faradic sinusoidal.

rate is proportionately active, the temperature rises and falls with reference to the relation of excretion and oxidation. The measurement of excretion for clinical purposes and for the practitioner will be sufficiently accurate if the quantitative estimation of solids is made; both the urinary and fecal factors are important. The following diagram will show how a daily record can be kept which will

Fig. 6.



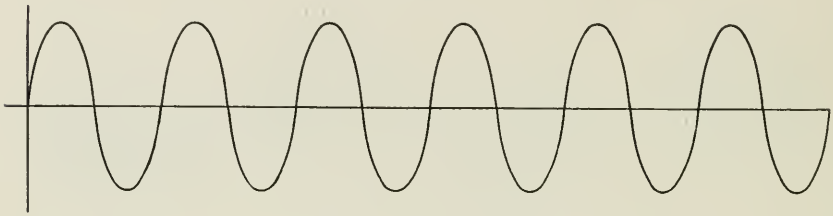
Multiple pitch variations.

clearly guide us in determining what is going on in the life processes of our patient.

It is, of course, to be clearly understood that rectal temperature is to be employed, and that the daily curve will be found to be closely connected with the excretory functions; should we ascertain from our patient's chart that the temperature reaches 100° or more and that there is little or no elimination, it will be a foolhardy step to employ any physical procedure which would add a toxic load to the blood at

a time when the eliminatory apparatus is not competent to take care of and unload the noxious material already in excess in the blood. On the other hand, should we see on our patient's chart a high degree of efficiency in elimination there would be little concern in employing a treatment of almost any degree of energy within the bounds of

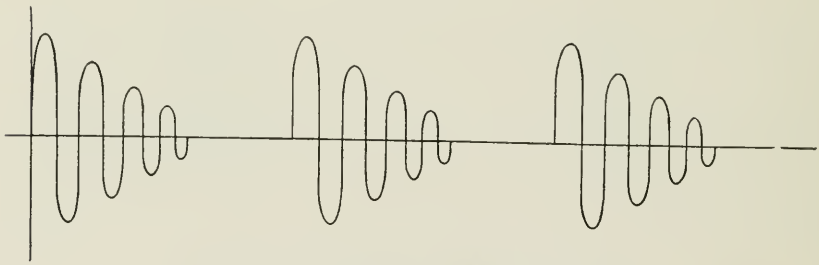
Fig. 7.



Alternating current sinusoidal.

safety, while a study of those cases where the temperature remains persistently low will very rapidly show that the blood is lacking in the properties necessary to maintain the high rate of tissue change. This may be due to low percentage of hæmoglobin, depriving the patient of the possibility of a high degree of oxidation. Again, the amount of oxidizable matter which enters the blood in transit may be low because of a diminished alkalinity, and consequent, diminished

Fig. 8.



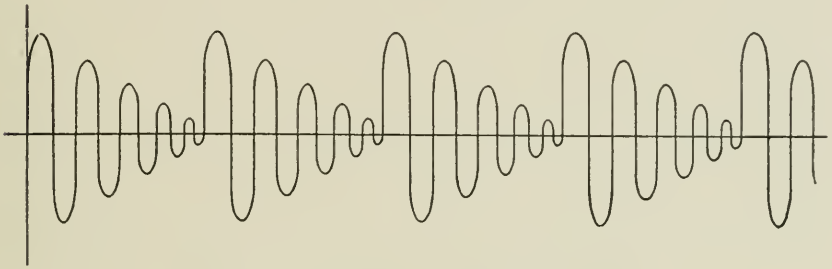
High-frequency currents. (See also Figs. 9 and 10.)

solvent power of the blood. This lowering of alkalinity may again be due to an absolute reduction in the amount of sodium salts present in the liquor sanguinis, or it may be due to an absolute increase of the water in the blood. The determination of the blood-pressure and of the specific gravity of the blood is a matter of great importance in each case.

The quantitative determination of sodium salts, as can be readily seen, is frequently of equal importance. The measurement of blood-

pressure as a means of determining the actual volume contained in the vessels is of equal importance with the above. Changes occurring in the corpuscles should be noted, as each morphological condition is closely associated with the physical state of the liquor sanguinis. The ordinary conception of anæmic blood and the relative value of

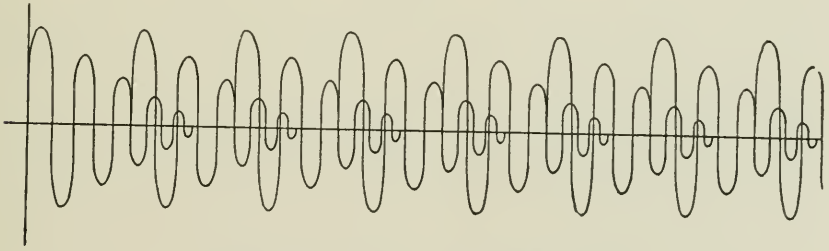
Fig. 9.



High-frequency currents. (See also Figs. 8 and 10.)

blood counts must be modified to correspond to our findings by actual measurement of the true degree of hydræmia which is present; since a normal total of corpuscles may be present in an increased volume of liquor sanguinis, which would show a low corpuscle count. The remedy for this condition would obviously consist in a reduction of the fluid portion of the blood, an excretion of water.

Fig. 10.



High-frequency currents. (See also Figs. 8 and 9.)

The work of Bouchard and his school has demonstrated that the loss of hæmoglobin going on in hydræmic blood is of such a character that the red blood-corpuscle is unable to maintain its normal hæmoglobin content as long as hydræmia is present, and I make the definite statement that the hæmoglobin loss is directly proportional to the degree of hydræmia present. This can be seen by the microscopic examination of fresh, unstained blood specimens, when the great

number of pigmented red blood-corpuscles will immediately be apparent, as well as those corpuscles preparing to shed pigment granules, commonly called pœcilocytes.

The specific gravity test for blood is made by the usual method of immersing a globule of blood in a mixture of chloroform and benzol. The blood, being insoluble in the mixture, rises or falls as the globule is heavier or lighter than the testing liquid; as the benzol is much lighter and the chloroform much heavier than blood, by adding either the lighter or the heavier liquid, we secure a fluid in which the globule neither rises nor falls. The specific gravity of the fluid is then measured. My own method is as follows: a special test-tube rack contains a number of tubes containing mixtures of various densities, and after some experience one can rightly approximate the density and the particular liquid is selected which is believed to be nearest to the gravity of the blood in question. The final addition of chloroform or benzol is made until the balance is struck.

A special hæmohydrometer was devised for the purpose, the accuracy of which is guaranteed to be within one per cent. at the temperature of 60° F.

The method is exceedingly accurate and, as described, not too cumbersome or slow.

Alkalinity can be determined by any standardized acid solution with litmus as an indicator. Sodium is determined roughly and rapidly by the photometric method; hæmoglobin by any of the usual color comparator methods.

The fecal observations are specially significant when we consider the true nature of this excretion. The fæces are a composite, essentially—first, extractions from the blood; second, biliary matter; third, residual matter from indigestible foodstuffs; fourth, shed intestinal cells, bacteria, etc.

Necessarily, the nature of the solid extractives is dependent to a great degree upon the dietetic habits of the individual, as well as upon the degree of oxidation going on. Expressed otherwise, the temperature is a measure of waste production. We cannot assume, however, that the eliminated matter is always proportional to the oxidation, because the extractives do not always keep pace with waste production.

This is a vital point in the determination of the character and

intensity of treatment by physical agents and, in fact, of all agents.

My own rule is as follows: when the temperature goes above 101° and the temperature continues to rise, the efforts are all directed to the eliminatory apparatus. When, however, the temperature sinks by reason of automatic readjustment, through sufficient elimination, we can employ our general or local treatment, the reason being that the efficiency of the blood in dissolving and conveying the wastes out of the tissues is greater than the total eliminative capacity, whereas when the temperature falls it can be due only to one of the two causes—the removal of the toxins from the blood through the removed wastes or the redeposition of the toxins or wastes in the tissues. We shall invariably find rises in the temperature after sufficiently active treatments when the physiological composition of the blood exists; we can thus state in absolute terms that fever is a process of repair.

Studies of the blood, therefore, should comprise determinations of

(1) Specific gravity.
(2) Pressure.
(3) Alkalinity.
(4) Sodium contents.
(5) Viscosity.
(6) Protein.
(7) Lime.
(8) Fat, sugar, etc.

The standards for health and functional capacity having been determined, the starting and measuring points are fixed whereby we are enabled to determine variations as to character and degree: that is the qualitative and quantitative factor of variation; the reasons for variation in function, the causes for change in processes both in kind and degree.

The solids of the body are the formed elements, either single cells, as the blood-corpuscles or lymph-corpuscles, or the organs which are structural aggregations of cells.

The formed elements have the property of working with and through the medium of the fluids. They are the specialized instruments for performing their respective work, whether this be special sense, intellection, digestion, locomotion, waste separation, etc.

The character of the work performed is dependent upon the

material supplied, by the fluid, both qualitatively and quantitatively. With the cessation of fluid supply, function ceases; as the quality and quantity of fluid is improved, so proportionally does the functional power increase.

The processes are the result of the mutual interaction of the fluids upon the formed elements, and, conversely, the action of the formed elements upon the fluids. The processes are the end sought by the existing arrangement of fluids and organic solids in contact. The processes represent heat production, power production, sense action, neural activity, digestion, circulation, waste production, etc.

The processes, therefore, become a measure of the efficiency of the fluids and formed elements. They determine the sum of the activities and fix the degree of life power either of a single function, aggregation of functions, or of the sum total which we call life.

Deviations in the composition of the fluids are the starting point for changes in the formed elements, as well as alteration in the processes of the body, and detract from the efficiency of the work of the formed elements and the processes inherent in the part, and, consequently, of the whole organism.

Our starting point in the study of the sick must be our study of the blood and the excretions, for, while from ordinary diagnostic methods we can and should determine the location of disturbance causing pain or other evidence of variation from normal, the causes which develop reactionary activity in the part may be due to deficiency in nutritive elements conveyed to, or failure to remove wastes, or even the stagnant harboring of toxic or irritant substances in the cells which are involved, brought to the part from other portions of the economy.

We can readily determine qualitative marked changes in the blood whereby we are taught the lacking function or element.

The customary action of certain toxic groups is in itself a guide as to their nature, and the study of the excretions is a further guide in this direction; although it must not be forgotten that the body may be excreting a certain substance freely, and the local symptom persists, due to

(1) The deficiency of local blood supply and therefore its non-entrance into the circulation; or

(2) Because the large quantity of material present in the body

is out of proportion to the daily excretable total. For example, the body contains 5 pounds of uric acid and excretes ¼ ounce daily, which would require 320 days to complete the work of removal (5 pounds, 8 ounces).

(3) Where the foreign substance in a part is a somewhat insoluble material the process of removal would also necessarily be of a sluggish character, assuming that a non-nitrogenous diet is used.

(4) The local disturbance or irritation is at times the concomitant of an elaborative action of the cells in breaking down contained substances, and is a part of the process of repair.

The study of the excretions is a guide as to the efficiency of the subtractive and analytical processes. Where our therapeutic procedures are correctly applied, this will invariably be found to be true.

What we can accomplish in the direction of altering organically changed tissues is remarkable, when we combine high physiological capacity of the body fluids plus the addition of physical agents suited to the special necessities of the particular condition under treatment. Since organic changes are due to the imbibition of substances other than those histologically present in the cell, and the lodgment of the substance as an enduring component of the cell must be due to the lack of the proper chemical conditions associated with the life of the normal cell, we cannot say that these precipitated matters are insoluble and unremovable, because repairs do occur and it must be our work to establish those conditions which redevelop the solvent power of the blood plus the thermic status normal for repair work, and the latter may be an elevated temperature.

The chemistry of the albumins is a vast subject, and our knowledge is still in a very incomplete state; we do, however, know much that is practically useful. An appeal is made by the writer to all workers in this field to devote much time and thought to this phase of the vast problem of tissue repair by physiological processes. The field is more than rich in possibilities, and will enable the giving of prognoses undreamt of by the routine procedures which have been in use heretofore. A final thought in this connection: Every dissolved waste product is a toxin, and all tissue change and repair is a process of toxin production; therefore, the more active are our procedures, the greater the toxin production. It is hoped that the brief outline developed here will prove not alone clinically useful,

but that the indicated line of work may aid in developing a host of workers in this vast and comparatively undeveloped field. Every

BLOOD EXAMINATION 191

M M. W. BRINKMANN, M.D.

Date	Pressure	Sp. Gr.	Hæmoglobin	Alkalinity	Sodium	Bile	Sugar	Corpuscles Red	Corpuscles White

URINE EXAMINATION 191

M M. W. BRINKMANN, M.D.

Date	Quantity 24 hrs	Color	Sp. Gr.	Acid	Sediment	Albumen	Glucose	Indican	Urea	Acetone	Diacetic Acid	Microscopic

RECORD 191

M. W. BRINKMANN, M.D.

M..... Address..... Occupation..... Vaccinated.....

Family history
Previous history
Sensation
Vision R L
Nose R L
Hearing R L
Smell
Taste
Throat
Lungs R L
valves

Heart, rhythm
rate
Vessels
Skin
Muscles
Lymphatics
Discharges
Swellings
Temperature
Height ft. in.
Weight
Teeth
Liver
Salivary glands

Stomach
Spleen
Pancreas
Intestines
Rectum
Uterus
Ovaries
Bladder
Prostate
Urethra
Testicles
Sediment
Fæces
Growths
Tenderness

physician can and should become a trained observer, and should habituate himself to record systematically.

The labor of recording, classifying records, and keeping this

information in available form is ideally accomplished by the card system. No commercial system can satisfy the wants of special workers, and each one will probably wish to develop his own system. The following set of forms are, approximately, those developed after years of experience in this direction, and may aid those contemplating the formation of a system for their purposes.

An important phase of the subject of physical therapy is involved in the character of movements inherent in the forms of energy employed. This necessitates a knowledge of the character, velocity, and type of the particular waves employed. Aside from the following discussion of the topic, the writer has been unable to find in medical literature the special consideration of this subject required for therapeutic purposes:

(1) Vibratory rates, and their range by absolute measurement.

(2) Reaction of tissue to them.

In a general way, cell life as an isolated entity cannot be considered in connection with vibratory rate. We are all of us too well aware of the fact that no cell is independent of its connection with, first, the nervous system; second, the blood circulation; and, third, its lymphatic relationship. When we, therefore, speak of the reaction of the tissues to any agent, either pressure or movement, we must, to a very great extent, conceive of the multiple actions which are going on, not alone in the protoplasm of the tissues of the part under treatment, but in the connections of that local tissue with all other parts of the human economy.

We must also conceive clearly what the meaning of reaction is in the tissue under manipulation, as well as the conception of our procedures locally with all other tissues. We expend a form of energy locally, and the local counteraction is enhanced by the propagated impulses through reflex action from the rest of the economy.

(*a*) To deny this is tantamount to the assertion that reflex action does not exist. We must, therefore, concede that there are under the influence of certain energy expenditures derivative actions of an unquestioned character, their degree, naturally and of necessity, being in direct proportion to the extent of local force application; derivative, therefore, as to the nervous, hæmatic, circulatory, and lymphatic systems.

(*b*) A peculiar action of the central nervous system connected

with the part, subjected to any energy application, must also exist, or, if denied, we must again deny the existence of reflex action. Again, the peculiarity and intensity of the action would depend upon the energy expended and the duration as applied to the periphery.

The question of rate will be discussed at another point. We have, therefore, afferent and efferent impulses with action of the particular nervous centre, as well as some degree of action in the co-ordinating centres. That is concentration of (1) sensory, (2) perceptive, (3) intellectual, (4) co-ordinating, (5) volitional activities, in the direction of the manipulated areas.

(*c*) The action of energy on isolated protoplasm has been carefully studied by many observers, but can have no clinical value, for the reasons already cited. Quantities of energy to an extent that are destructive of life in protoplasm will not be considered, for dead tissue cannot react, in any reasonable use of the term.

The writer has frequently stated that remarkable phenomena result from the application of different vibratory rates: (1) single, (2) double or multiplex, (3) harmonious or inharmonious, (4) persistent as to rate or pitch, (5) varying as to rate or pitch. It is improper to inject into this intricate problem, at this point, the question of intensity or amplitude of vibration. The vibratory rates, which are under immediate discussion, extend from 15 to 20 per second, in continuously increasing velocity, to a point where they are infinite in rapidity, stated to the lay mind—a speed beyond the comprehension or computation of any mind. We have slow speeds, conceivable by the senses up to perhaps 40,000 per second for the ear; common sensation goes much higher, for we can estimate heat by our sensory peripheral apparatus (so-called temperature sense). The eye can recognize oscillations whose speed reaches many millions per second up to the end of the visible violet end of the spectrum. The nasal and gustatory sense cannot enter into a rational discussion, as the data are insufficient—since we know not whether the action of taste and smell depends upon the mechanical stimulation or the mechanico-chemical or chemical or vibratory action.

Rates beyond the perceptive capacity of the unaided sense organs possess the ability to call forth reaction. For example, sunlight, as light with the heat filtered out, can produce erythema and, secondarily, tanning; the chemical reaction to the X-ray, in the tissues as also the biological one, both of which are unquestioned. Whether

these two cases are purely the result of vibratory rate is to some extent open to question; since the ionic action, the foot-pound action, and the nervous system inject questions of great complexity.

The essential factors of vibratory or undulatory action are (1) intensity or quantity, (2) quality of rate. If a blow of definite intensity be applied a definite number of times in a unit of time, we must assume that when the same intensity is maintained and the blows are applied twice as often in the same time unit the effect would be twice as great, since we have $r \times t = e$, where $r =$ rate, $t =$ time, and $e =$ effect. Throughout Nature, upon inanimate matter, this law holds good. We will again, however, simply refer to the fact that biologically there are always to be considered appreciative capacity or sensorium and reflex action. For high rates the same principle applies as to resultant effects.

Rate, therefore, is an important factor for our consideration, whether simple, as in the case of a musical note, a specific color, or a definite temperature; or, again, compound, as in the case of a harmonic sound combination, as a musical chord, or a secondary color of the spectrum; multiplied, as in the case of many coincident sounds, producing simply noise, or, again, white light as a result of the combinations of all the spectral vibratory rates.

We have, then, the lowest rates acting, either through mechanical methods, such as mechanical vibration, electrical methods, as the induction currents, low-rate wave current, low-rate static induced, the recently-developed unidirectional, high potential, high milliamperage current, generated by an alternating current apparatus and sent through a closed magnetic circuit transformer, rectified, and again transformed through the use of proper capacities; solenoid and spark gap, interrupted at a slow rate by the proper use of the special spark gap connected to the Oudin apparatus on the ball of the solenoid; also a low-pitch musical rate. All of these give the reactions of slow vibratory rates.

Following this come the complex rates of every form of motion below the lowest heat-rays: the tri- and bi-infra red of the spectrum.

Harmonic or inharmonic forms of undulatory energy: these are all compound or complex, as would be the case when heat and light rays or undulatory currents were mixed.

The thermic rates are next in order. These cover a very wide range, since cold is relatively a degree of heat. We can speak of

hydrotherapy, thermotherapy, climatology—where temperature considerations are the leading factors in practical application; liquid air to the actual cautery is included in the thermic rates. Phototherapy is embraced in all the rates as found in the visible spectrum, from the red end to the violet and the great infra-red and ultra-violet ends. The presence of the ultra-violet can be detected by the glow of willemite, its rate more rapid, its wave length shorter, its effects distinctly different, especially the chemical and sedative effects.

Next in order come the cathode rays, as found in radium, polonium, etc.

Beyond this we reach the X-ray with all of its peculiar manifestations; the high-frequency currents as derived from condensers of very small capacity and a large charging source with a small spark-gap. Limitless velocity can be obtained by the relationships of condenser, charging quantity, and spark-gap. The velocities have been computed in practical apparatus to reach five billion per second.

MEASUREMENT OF VELOCITIES AND WAVE LENGTH

The following table represents the vibration rates per second as they exist in the various pitches or notes found in the musical scale, but goes lower and much higher than the musical register in ordinary use. The writer arranged this table eight years ago for use in connection with the tuning of his harmonic coils.

	C	C≠	D	D≠	E	F	F≠	G	G≠	A	A≠	B
C^{iv}	16	17	18	19	20	$21\frac{1}{3}$	$22\frac{2}{3}$	24	$25\frac{1}{3}$	$26\frac{2}{3}$	$28\frac{1}{3}$	30
C^{iii}	32	34	36	38	40	$42\frac{2}{3}$	$45\frac{1}{3}$	48	$50\frac{2}{3}$	$53\frac{1}{3}$	$56\frac{2}{3}$	60
C^{ii}	64	68	72	76	80	$85\frac{1}{3}$	$90\frac{2}{3}$	96	$101\frac{1}{3}$	$106\frac{2}{3}$	$113\frac{1}{3}$	120
C^{i}	128	136	144	152	160	$170\frac{2}{3}$	$181\frac{1}{3}$	192	$202\frac{2}{3}$	$213\frac{1}{3}$	$226\frac{2}{3}$	240
C	256	272	288	304	320	$341\frac{1}{3}$	$363\frac{2}{3}$	384	$405\frac{1}{3}$	$426\frac{2}{3}$	$453\frac{1}{3}$	480
c^{i}	512	544	576	608	640	$682\frac{2}{3}$	$725\frac{1}{3}$	768	$810\frac{2}{3}$	$853\frac{1}{3}$	$906\frac{2}{3}$	960
c^{ii}	1024	1088	1152	1216	1280	$1365\frac{1}{3}$	$1451\frac{2}{3}$	1536	$1621\frac{1}{3}$	$1706\frac{2}{3}$	$1813\frac{1}{3}$	1920
c^{iii}	2048	2176	2304	2432	2560	$2730\frac{2}{3}$	$2903\frac{1}{3}$	3072	$3242\frac{2}{3}$	$3413\frac{1}{3}$	$3626\frac{2}{3}$	3840
c^{iv}	4096	4352	4608	4864	5120	$5460\frac{1}{3}$	$5806\frac{2}{3}$	6144	$6485\frac{1}{3}$	$6826\frac{2}{3}$	$7253\frac{1}{3}$	7680
c^{v}	8182	8704	9216	9728	10240	$10920\frac{2}{3}$	$11613\frac{1}{3}$	12288	$12970\frac{2}{3}$	$13653\frac{1}{3}$	$14506\frac{2}{3}$	15360
c^{vi}	16394	17408	18432	19456	20480	$21841\frac{1}{3}$	$23226\frac{2}{3}$	24576	$25941\frac{1}{3}$	$27306\frac{2}{3}$	$29013\frac{1}{3}$	30720
c^{vii}	32788	34816	36864	38912	40960	$43682\frac{2}{3}$	$46453\frac{1}{3}$	49152	$51882\frac{2}{3}$	$54613\frac{1}{3}$	$58026\frac{2}{3}$	61440

The velocity of sound in air is 1093 feet per second; the wave length is determined by dividing the number of vibrations per second into this number. We then have the lineal measure of the individual wave lengths. The number of vibrations is determined by the siren or chronograph method. The estimation of wave lengths for the different portions of the spectrum is established with a very high degree of accuracy by fixing with a micrometer screw the difference in posi-

tion of the cross wire of a telescope upon either the bright lines of the incandescent spectrum or the dark interference bands.

The length of the undulations have been established as follows (at dark lines in decimals of an inch):

B at red and orange	.0000271
C at orange and yellow	.0000258
D at yellow and green	.0000244
E at green	.0000207
F at green and blue	.0000191
G at blue and indigo	.0000169
H at violet	.0000155

or, again, on color basis:

Hertzian wave lengths, several meters or more.	
Infra ultra red	.18 microns
Ultra-red	.08
Red	.71
Orange	.66
Yellow	.62
Green	.53
Blue	.40
Indigo	.41
Violet	.38
Ultra-violet	.21
Ultra, ultra-violet	. 1
X-ray (estimate)	.014

The micron is the equivalent of one-millionth of a metre, or one-thousandth of a millimetre.

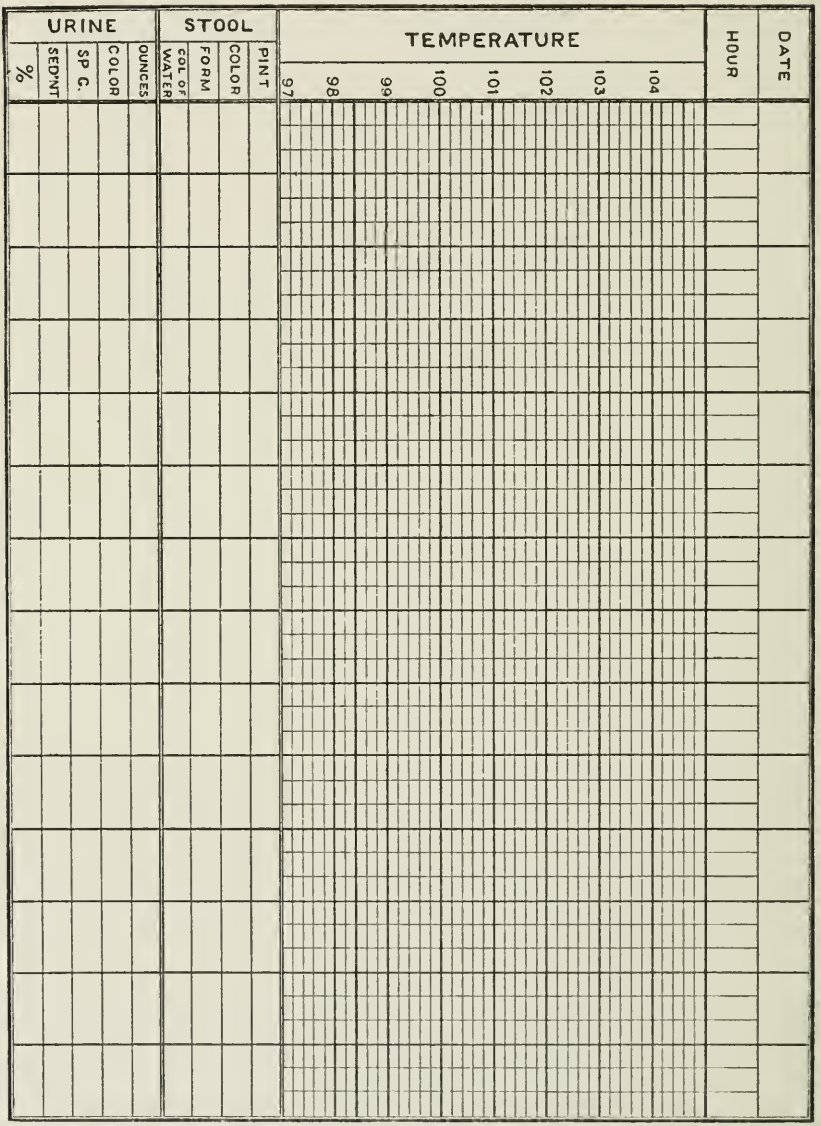
The reactions of tissue to varying undulatory rates should be moderately and measurably well known to all physicians employing physical methods. A brief review would not be out of place at this time. The longest wave lengths having a greater oscillatory length are, all things considered, the most competent to impress and call forth reactions in tissue. Therefore, low rates, mechanical vibration, low-pitch Faradism or induction currents, the wave current with small or moderate spark-gap, the various applications of cold, are all, when briefly applied, of a tonic nature, since the reactive powers are only moderately developed and call into play efferent reflex nerve impulses that vitalize and potentize tissue. Overuse of these agents would develop inhibition and palsy, as would be the case with all oscillatory movements upon tissue when too protracted.

High-pitch alternating induction currents, large spark-gap wave

currents, high discharge rate of static induced current operate as sedatives on tissue when reasonably applied, more vigorously as analgesics.

M

FIG. 11.



Caloric rays at the infra-red and red end of the spectrum must have analgesic properties in a higher degree than the last. This

property must become progressively of greater and greater importance as we rise in the scale of speed and shortening of wave length through the different spectral rates and beyond as far as the X-ray.

Any excessively protracted application must produce degrees of reaction in proportion to the exposure, from superficial erythemata to ulcerative processes.

In protracted X-ray exposures we have clinical histories of tissue so devitalized as to become leather-like. Even ulcerative results have been noted, though rare. These latter cases are examples of such inhibition that reaction is almost impossible.

The high-frequency current is capable of producing a primary anæmia, followed by intense congestion and even exudation. When protracted application was made ulceration has been noted; although, of course, a high milliampere in such cases has been sparked upon the tissue. General reaction is secured by protracted applications of any vibratory movement; cold affusion, low-pitch alternating induction currents (Faradism), when protracted, causing general relaxation, as also all forms of high oscillatory rates when too long continued. The X-ray, when too long applied, must follow the same general law, aside from toxic absorption from destructive tissue metamorphosis: also the high-frequency current from a coil, which is the alternating type, or from the modern transformer type of apparatus, which is unidirectional and polar in action; therefore having ionic properties. These are fed with heavy currents and, run through D'Arsonval and Oudin apparatus, unquestionably elevate temperature; whether this is due to vibratory rate alone is questionable, as 110 volts and 5 to 10 ampères mean from 550 to 1100 watts, therefore ⅔ to 1⅓ horsepower, or 22,000 to 50,000 foot-pounds; or, assuming the usual factor of a heat unit as 1390 foot-pounds, we have 15.82 to 36.07 thermal units—certainly sufficient to account for the heating effects without vibratory action; in the light of a carrier of energy, which it certainly is.

CONCLUSIONS

A. (1) We have means of producing and applying known and measured vibration rates from the slowest up to infinity.

(2) Results are partly known and partly unknown in the reactive capacity of tissue, heating, nervous phenomena, circulation, metabolism, etc.

(3) General effects upon (*a*) nervous system, (*b*) circulation of blood, (*c*) circulation of lymph, (*d*) temperature are all tonic.

B. Under this head come the sedative effects from the higher rates.

C. The inhibitory effects due to long exposures or high vibratory rates.

D. Destructive effects due to excessive exposure to high rates carrying heavy amounts of energy.

The consideration of electrodes or devices for securing convection or disruption of the current to the part under treatment is of very great importance because the technical use of the current depends upon the character of the contact, whether with firm pressure, loosely applied, or with an air gap. The area of the electrodes is of importance in connection with the concentration of the lines of force on the basis of square centimetres or square inches per electrical unit of quantity. The material of the electrode is of importance in connection with its flexibility, its conductivity, its ionic properties, and its heat-conducting properties. Finally, the form of the electrode is of importance in order that the contacts may be suitable for the parts under treatment. This field furnishes opportunity for the ingenuity of the practitioner which is almost endless, and requires, as in the case of complicated electrodes, a consideration of the electrical, mechanical, and anatomical factors involved in the particular case under consideration.

In the use of phototherapeutic or thermotherapeutic apparatus we must bear in mind the law of radiant energy; namely, that the energy quantity is inversely as the square of the distance, and that disagreeable results follow when the principle involved in this law is not followed in practice. The danger is not great when the patient is in full possession of the sensorium; when there is anæsthesia, however, serious results might follow the application of heat or light energy; or, again, when the energy is applied to parts or surfaces poor in sensory nerve filaments, as, for example, the endometrium. This subject is becoming of greater importance at this time on account of the recent advances in the construction of endoscopic apparatus, and endoscopic treatment and operating devices.

Progress of Medicine
During the Year 1912[1]

BY HENRY W. CATTELL, A.M., M.D.
Editor of "Lippincott's Medical Dictionary," Philadelphia

AND

LUCIUS W. JOHNSON, D.D.S., M.D.
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THE WORLD'S UNREST

"Is not the whole world in the throes of a travail to produce something new, something perhaps better than we have ever known, which it may take long to perfect or to achieve, but which, at any rate, means a new evolution?"

These words, spoken by Lord Rosebery at the Congress of Universities of the British Empire, held at London in July, well express the passing of the old order of things and the changing of the existing conditions of the practice of medicine to such an extent that no one can foretell what lies in store for each of us individually and for all of us as a class. Altruistic ideals innate in the breast of every physician have too often of late been chilled by the want of money to provide even the bare necessities of life, ever increasing by the rising cost of living. Have not physicians and surgeons connected with an endowed or subsidized hospital too frequently formed an inner coterie from which the mass of the profession have been rigorously excluded? Yet how is the best work in medicine to be accomplished unless such facilities are offered for original

[1] The following journals have been freely drawn upon in the preparation of this article: the *London Lancet*, the *Journal of the American Medical Association*, the *British Medical Journal*, and the *Literary Digest*. Where the year of publication of the periodical is not mentioned, it is 1912. The review covers the period from February 1, 1912, to February 1, 1913, and it is to be remembered that certain topics not touched upon have been gone over recently by the insertion of original articles covering this ground during the publication of the Twenty-Second Series of the INTERNATIONAL CLINICS.

investigation as exist in the Rockefeller Institute, the workings of which were so well described by Dr. Auer in the last issue of the INTERNATIONAL CLINICS? Contrast the illustrations there given with the pictures of Dr. Mudgett's tuberculous patients in the poorer districts of Philadelphia being restored to health by living on roofs and in backyards in tents obtained as a premium from the sale of soap (INTERNATIONAL CLINICS, volume i, p. 71).

Again, how is it possible for the hospital receiving State appropriations to open its operating rooms to surgeons of inferior rank without the greatest detriment to the patient, to the mortality statistics of the hospital, and to an increased expense account in running the wards? As long as a hospital staff and corps of experimenters do their work honestly and well, concentration of interest in this form of specialization tends to promote the best welfare of the public; but we fear that the power now possessed by certain ambitious, designing, and even unscrupulous members of the medical profession will, perhaps even in the near future, cast discredit upon the work of that great body of physicians,—zealous and honest to the core,—who labor not solely for their own profit, but to alleviate the ills of humanity!

THE WORKING OF THE NATIONAL INSURANCE ACT FOR THE UNITED KINGDOM

The National Insurance Act (1911) for the United Kingdom, so fully described by Dr. J. W. Ballantyne in Volume II of the Twenty-second Series of the INTERNATIONAL CLINICS, went into effect on January 15, 1913, and at the time of going to press Mr. Lloyd George, the Chancellor of the Exchequer, has dispersed the six cardinal principles of the British Medical Association to the winds, and panels have been formed for the workings of the act throughout the country, with the physicians employed under contract at so much per capita. This piece of legislation completely revolutionizes the practice of medicine, bringing one-half of the population of the United Kingdom under contract practice, and affects the voluntary hospitals, medical education, and the ideals of the physician to such a marked degree that no one can foretell the exact status of the medical man of the future.

One of the first patients to die under treatment after the National Insurance Act came into force was Frederick R. Townsend, a builder's laborer. Coroner Ingleby (*Brit. Med. Jr.*, January 25, 1913) summed up the evidence in the case as follows:

This is a very sad case of a man of 53, who was at work a week ago. He was suddenly taken with abdominal pains and sickness, and he went to a doctor, who was overwhelmed with work and who had to contend with a long queue of insured people waiting to get their papers signed. The doctor did not think there was anything seriously the matter with the man, and gave him a simple remedy and sent him away without examination. Next morning, apparently, the patient was in a most serious condition, and one which was bound to kill him unless he had an operation. He went to see the doctor, who was again overwhelmed with patients, and had not time to examine him as he should have done. Although the man told him that he had a pain in the abdomen and was suffering from sickness, the doctor thought it was a case of indigestion or colic, and gave him a prescription, which the patient had made up. He never saw the patient again. The man went home, and on Thursday he got so much worse and his symptoms became so grave that he must have been dying that night. His wife said she did not know where to go for Dr. H——, whose lock-up surgery was closed at night, and she naturally thought it was no use going there. The result was that nobody saw her husband till after death, when she called in the nearest doctor. All this time the man had been suffering from a complaint which could have been relieved by an operation which is almost invariably successful, and here was the case of a man whose life ought to have been saved, but owing to the unfortunate circumstance that the doctor did not examine him he did not diagnose what he was suffering from. The doctor had told them at the inquest that he did not have time, as he was engaged six hours at a stretch signing cards, doing clerical work instead of attending to his practice, and it was the same all the week; and this poor man's life had unfortunately been lost. If Townsend had gone to the hospital with his grave symptoms the doctors, who were always on the alert, would have recognized his condition of strangulated hernia and would have operated upon him. At St. Thomas's no doubt he would have been brought back to practically normal health, and his life would have been saved. It had been lost, however, and it was a very regrettable state of things. He sincerely hoped it would not occur again that a doctor representing the Government would be placed in such a position that he had no time to examine a case which might be a grave and fatal one.

The jury, after deliberating in private, returned a verdict of "Death from natural causes," and added a rider that more care should be exercised in future in the matter of examining insured persons by doctors under the National Insurance Act. They excused Dr. H—— in this case "owing to the scandalous amount of work that was imposed upon him under the act."

THE GENERAL PRACTITIONER OF TO-DAY AND OF TO-MORROW

Dr. Edward W. Watson ably went over in last year's Progress of Medicine the doom of the general practitioner, and whether it will end by giving increased powers to our present Boards of Health or in a service with a guiding hand from Washington, with its head a member of the official Cabinet of the President, who can say? Certainly the physicians of America are watching with keen interest this utopian experiment of England in order to face the same question which will undoubtedly be shortly raised here in America. With us it will probably take longer to effect this change on account of the increased safeguarding of state's rights by the election of Mr. Woodrow Wilson as President of the United States.

This running of everything into one mold, which permits no individuality of thought, does not seem, at least for the present, to be for the best interests of the medical profession. Indeed, from a legal standpoint, it is becoming dangerous for the practitioner to fail to conform to a recognized mode of treatment, even though his best judgment condemns its employment as unnecessary or even harmful. When the practice of medicine is limited to a set formulary of treatment,—a ready-made pill supplied for a large number of patients,—we certainly shall have reached a stage in the art of healing but little higher than that of the abused shot-gun prescription of the past.

A pharmacist, Mr. William G. Toplis, of Philadelphia (*Am. Jour. Pharm.*, January, 1913), summarizes the progressive movement in medicine, as he sees it, in the following words:

> Between the years 1922 and 1932, we may expect to have established a National Board of Health, with a chief officer in the cabinet and an organization similar to that of the Army, and in which every physician and every Pharmacist will be an officer of the United States Government. Those physicians under the new order who remain in the office awaiting the call of the sick will be comparatively few in number. The remainder will be out in the broad domain of practical hygiene, every factory, farm, field, forest, stream, mine, and what not, will then come under the watchful eye of this new army, and, with all of the wisdom of science, it will guard the health of the country, if any thing, more jealously than it is guarded against foreign foes. Every occupational disease will be banished, every case of communicable disease will be promptly isolated.
>
> The men who are to perform this service will be the doctors and druggists of to-day who survive at that time, together with those who shall be hereafter graduated in those professions. Not that all of these men are at present fitted for this work, but their training and experience make them the most available.

They will, however, be subject to periodic examinations that shall determine their advance and pay, and each one will gravitate into the place that best suits his capacity. The pay of these men will be suitable to the dignity of their calling, certainly not less than that of a lieutenant in the United States Army. Under this new order the people will receive their medicine and medical treatment upon the same plan that they now receive their public school education. To the incredulous, it may be said that the people of Philadelphia alone spend annually fifteen millions of dollars for medical treatment, and medicine. Under the new system the cost would be less than half of that sum, and the people will receive better attention than at present. Schools of medicine and pharmacy will be government institutions, such as West Point and Annapolis, and their various laboratories will be the main centres from which the operations of this Hygienic Army shall be directed. To the incredulous, again, it may be said, these conditions are coming not because they are being sought, nor even desired, but they will be thrust upon us through the force of economic necessity.

THE CRIMINAL ABORTIONIST

It can safely be said that the rank and file of the profession honestly and fearlessly subscribe to the Hippocratic oath in regard to the non-performance of criminal operations. The decision of the question as to what the practising physician is to do when confronted with the treatment of a patient upon whom a criminal operation has been performed is of paramount importance to his future reputation in the community in which he practises his profession. A physician knows the law as to what he ought to do in a case of contagious disease reportable to the Board of Health, but he does not know his duty when called in to treat a case of criminal malpractice. It should be remembered, first of all, that under the law any one referring a woman, pregnant or supposed to be pregnant, to another physician with the object of having a criminal operation performed upon her person, is equally guilty in law with the one who actually does the operation. To our mind the reputation of the physician should be always upheld by a consultation, and the securing of a properly signed and executed dying declaration, should death be feared. Professional secrecy should be maintained in every possible manner, but this does not mean that the one illegally interfering with the course of nature should go unpunished.

The *Lancet* (January 4, 1913, p. 52) has this to say about professional secrecy:

At a recent inquest near Liverpool the question of a medical man's attitude towards his patient's confidential communications was raised. In this case it was proved that the subject of the inquiry, a dairymaid, had died from septic

peritonitis due to the performance upon her of an illegal operation; and, in the absence of any evidence as to who had performed the operation, a verdict of wilful murder by some person or persons unknown had to be returned. The medical testimony left no doubt as to the fact that an illegal operation had been performed. There was also evidence that the deceased had spoken of having travelled to Liverpool to be operated upon there by a woman, with the result that a miscarriage occurred, but she had refused when dying to divulge the woman's name, and there was no clue discoverable as to who the criminal might be. Dr. R. Hill Brown, to whom the deceased had admitted that she had paid seven visits to the woman responsible for her death, could tell nothing as to the identity of the person referred to. It was suggested to him by a police superintendent, when in the witness-box at the inquest, that as he knew two days before death that a crime had been committed he ought to have then and there informed the police of it. To this he naturally and rightly replied that a medical practitioner was in a confidential position with regard to his patient, his duty being to do for her the best that he could. In this plea the coroner supported the medical witness, and the superintendent had to content himself with observing that it would have helped the police greatly to have known of the case earlier. We fully sympathize with the difficulties of the police in these cases—they are of regular occurrence—and we are sure that no one would more willingly have given any information enabling the police to track out a professional abortionist than Dr. Hill Brown. But a medical practitioner's first duty is to his patient, whose confidence he must respect and whose secret he must guard within reasonable limits. The case in question clearly demanded the silence of the medical man until his patient died. During her lifetime to give information to the police could have done her no good, and might perhaps have involved her in a criminal charge. After her death there was no such reason for silence, and as a matter of public duty the medical man who knew certain facts through attending her gave them in evidence. He could not give the name of the abortionist, for this he did not know.

FEE-SPLITTING

The receipt by the general practitioner of commissions from the specialist, and by the medical profession in general from commercial houses, has caused considerable comment during the past year. Dr. W. Wayne Babcock made the statement before the Philadelphia County Medical Society on November 13, that the giving of commissions by instrument, bandage and truss makers, and those who fit orthopædic appliances, is almost universal in Philadelphia, and we know of a number of instances in New York, where the physician referring a burial to an undertaker has received for this service a cash payment, at times amounting to many dollars. The very secrecy with which such transactions are consummated shows that the contracting parties do not wish the fact of the payment of this money to be made known to the patient. Certainly there is often too great

a discrepancy between the routine fee of the general practitioner who makes the diagnosis in appendicitis and that of the surgeon who operates upon the patient. Numerous articles have appeared in our medical journals and in the lay press justifying this procedure, while others have vigorously opposed the method as tending to lower the dignity and the morals of a noble profession. In the editorial columns of the *New York State Medical Journal* its editor, Dr. A. T. Bristow, has more than once pointed out that the evil practices of fee-splitting are the result of the intolerable economic conditions which surround us. He writes (*l. c.*, February):[1]

Minatory resolutions against fee-splitting on the part of county societies and the respected New York Academy of Medicine have a purely academic value. They are expressions of virtuous sentiment which are creditable, but they have been, and will continue to be, quite useless as remedies. To expel members of county societies for fee-splitting could be done only on legal evidence. How is the society going to get this evidence? Certainly not from either of the two parties to the transaction. A law which cannot be enforced is a bad law, because it brings the law into contempt. Why is it not just frankly to inquire whether with all the difficulties which are confronting the general practitioner he is at present getting a square deal from the specialist and the public? Has he not a real and a substantial grievance? Let us take one instance which will serve as a type of many. A struggling practitioner is called to see a case of abdominal pain. He makes two or three visits, decides that the case is one of appendicitis, calls a surgeon, who confirms the diagnosis and advises operation. The patient is removed to the hospital, for the time being passes out of the sphere of influence of the family practitioner, ceases for that time to be a source of income to him, which is, in fact, transferred to the surgeon. Let us estimate the income of this particular doctor at $2000 a year, which is twice the estimate of the average physician's income. The surgeon for his services receives $150, 7½ per cent. of the entire annual income of the physician who has surrendered the case. The least that can be said of such a situation is that it is full of temptation for the poor doctor and the ambitious surgeon. Is there any remedy? I do not know, but with the greatest diffidence and the knowledge that I may be misjudged and misunderstood I offer the following: First, that the county society recognize the inequality of such transactions and the substantial injustice to the general practitioner who is not adequately paid for his responsibility in recommending operation in conjunction with the surgeon. Second, that the county society, in consideration of all the known facts, say that it shall be allowable and proper for the physician and surgeon to render a joint bill to the patient in which the family practitioner shall be recognized as he never has been heretofore except on the sly and by a secret agreement—in itself always a bad thing. What compensation shall go to the physician and what to the surgeon I leave for discussion. It is not an easy matter to determine, but I offer the suggestion tentatively and mainly for the purpose of eliciting discussion. It seems to me to be practicable and, in so far as the transaction is *known* to the patient, also honorable.

QUACKERY IN GERMANY

In the bulletin on "Medical Education in Europe" issued by the Carnegie Foundation of New York City, Dr. Abraham Flexner gives us some astonishing facts in regard to the prevalence of quackery in Germany, that land of the scientist. With the abolition of the law which required physicians to pay a special tax and to give a certain amount of service gratis to the poor, but which, on the other hand, suppressed the illicit and unlicensed practice of medicine, the irregular practitioners, Christian Scientists, Healers, Baunscheitists, and the devotees of other cults, have increased to an enormous extent. Some writers attribute this to the high standard required by the German Government, but it would seem to be the direct result of ill-considered and vicious laws; for, strange as it may seem, this rise in quackery has kept pace with the progressive overcrowding of the profession. The quack, too, flourishes best in the vicinity of the regular practitioner. Berlin now registers 3,584 physicians and 1,349 quacks who advertise their nostrums in the press, and the actual turn over in Prussia alone from proprietary remedies exceeds 30,000,000 marks.

BUT DO NOT CALL ANOTHER A QUACK

The *Medical Times,* July, states that the man who claims positively to be able to cure a disease is a fraud, and should be relegated to the land of frauds from whence there is no return, and seriously proposes the enactment by all State Legislatures of a law making it a crime to advertise or to assert that any medicine is a "positive cure" for any disease! Suits for damages for alleged malpractice by the licensed doctor are on the increase, while the quack gives with impunity a live tape-worm to reduce obesity, and receives an honorarium therefor of several hundred dollars, and the National League for Medical Freedom can find university graduates to espouse its cause.

The suit in England won by Bell over Bashford and the British Medical Association should make one cautious in calling anyone a quack, the more especially as what the so-called quack advocates to-day may be routine general practice in the future.

PROGRESSIVE LEGISLATION

Progressivism is in the air. Legislation most unlooked for is to be recorded upon our statute books. Thus, Utah requires the reporting

of venereal diseases, and castration for defectives is now being actively carried on in a number of the States. Again, a bill has been introduced in the South Carolina Legislature "to allow prisoners convicted of capital crimes the choice of electrocution or inoculation with the germs of pellagra." This bill has been indorsed by many of the medical men of the State.

Diseases heretofore undreamt of as being traumatic are found, upon close scrutiny, to be due to injury. Malingering and deception will steadily increase, as has been already demonstrated in those countries where compulsory insurance laws have been long enough in operation to furnish some valuable data concerning the working of these Acts.

THE DEATH OF LORD LISTER [1]

Full of years and honors, the greatest Englishman of the nineteenth century has gone to his rest. We claim this position for Lord Lister, not only by reason of his actual achievements in the preservation of life and in the relief of suffering, but still more by reason of the qualities of intellect and of character which rendered those achievements possible; qualities among which an absolute devotion to the ascertainment of truth was perhaps the most conspicuous. To him, as to the few philosophers of approximately equal rank who have preceded him, an established truth was a possession too inestimable to be measured by ordinary standards of value; and no pains, no self-sacrifice, could be too great to be spent in its attainment. He had the signal advantage, as regards contemporary fame, over the only men who could be mentioned as his intellectual peers, over Newton, over Thomas Young, over Darwin, that the problems to which he addressed himself were of direct and immediate bearing upon the welfare of the human race, and that his solution of them placed him at once in the forefront of human benefactors. Those problems, and especially the central one among them, the cause of decay and putrefaction in wounds, and the reasons why these changes were more prone to occur when wounded persons were collected together within a limited space, had occupied the minds of many keen observers at many times and in many countries; and William Clowes, the great English surgeon of the sixteenth century, has left behind him not only a description of the conditions which could scarcely be surpassed, but also a lucid statement of the reasons which forbade him to accept the belief that they were due to the use of poisoned bullets or weapons by the Spanish soldiery against whom his countrymen were contending in the Netherlands. In those days the circumstances conducive to widely spread gangrene hardly existed except in time of war, and, save for a few so-called "hospital" cases, it was not until the beneficent action of anæsthetics began to bring great numbers of peaceful people under the hands of the surgeon that there arose a pressing danger of the practical neutralization of the expected good by the occurrence of great and wholly unexpected evils. Even in private houses, and, as

[1] *Lancet*, February 17, 1912. Lord Lister's death took place on February 10, 1912.

it seemed, amid surroundings of the most favorable kind, the operations which, because they could be rendered painless, were freely and hopefully undertaken, were in a lamentable proportion of cases rendered of no account by death; while the surgical wards of many hospitals became veritable pest-houses, from which escape with life could hardly be regarded as probable. It seems scarcely credible to-day, but is none the less true, that only half a century ago it was gravely proposed that surgical hospitals should be temporary buildings, which should be destroyed by fire, as dangerous nuisances, after the fulfilment of two or three years of existence, or as soon as gangrene became of common occurrence among their inmates.

At this time Lister, who was the son of a scientific father, and had been trained in a scientific direction by his influence and his example, had already for some years been engaged in careful research, exercising and developing the faculties essential to accurate investigation. He had learnt how to frame and how to verify or to refute hypotheses; he had learnt how to establish facts in such a manner as to render each one a stepping-stone to further progress; he had learnt to question the accuracy of his own conclusions, and this the more stringently, the more they seemed to be conducting him towards some wished-for goal. He was at the zenith of his powers, gazing sadly at the evils of unknown source and origin by which the best skill of the surgeon was so constantly defeated, when the news came to him of Pasteur's discovery of the cause of putrefaction, and he hastened to acquaint himself with details which he at once perceived, with the intuition of genius, might supply him with the clue of which he was in search. Each of the two great men has vied with the other in extolling the share taken by his fellow in the production of the total result; and it is manifest that there can be no question of originality between them. It is unlikely, to say the least, that the attention of Pasteur himself would ever have been directed towards hospital phenomena, and the range and scope of those phenomena were sufficiently wide to furnish complete occupation for many years of strenuous and persevering industry. We have sometimes been reminded, by the history, of what has been recorded by Coleridge concerning the origin of penny postage. A pedestrian, wandering in Cumberland in the early "thirties" of the last century, found a poor girl crying in the road because she was unable to pay the postage of a letter from her brother, who had gone south in search of work. The pedestrian paid the postage, and gave the girl her letter. Most tourists, in similar circumstances, would probably have done the same; but this tourist was Rowland Hill, and the incident germinated and bore fruit. Most surgeons would have been interested in Pasteur's discovery; but the only one who saw its full significance was Lister, and his life was thenceforward devoted to the realization of the vision which had been revealed to the insight of his genius, but which never could have been realized without the most patient, continuous, and unwearied industry. The generation is passing away which witnessed the labors of the great discoverer in the direction of perfecting his work; but none of those who now profit by it should forget the opposition which it encountered or the placid courage with which successive positions were either justified and maintained or were abandoned as soon as their originator became convinced of their unnecessary character. Gradually, and step by step, the conditions essential to the asepticity of wounds and injuries were established; and the great philosopher was revealed to the world in the full lustre of his fame.

The picture is worth gazing upon. . . . But those who know or who study these details will recognize that even his luminous intellect would have failed to impress itself upon his generation had it not been allied with other qualities only less great, and, unfortunately, not too common. The brilliant imagination, the almost inspired genius, the philosophic insight, would have been of comparatively small account without the support which they derived from unflinching courage and untiring industry. Without these aids, the sneers and contumely with which his earlier announcements were received could scarcely have failed profoundly to discourage him, or even to interrupt the course of his investigations; but he passed through the turmoil as if hardly aware of its existence, and confined himself from first to last to the facts and questions which were of essential bearing upon the truths which it was his mission to establish. Perhaps few things were more galling to his early adversaries than the manner in which he refrained from "railing accusation," and, while never omitting to deal with any real difficulty, treated difficulties which were imaginary or irrelevant with an indifference that must sometimes have been more galling than expressed contempt. Eager to teach and to explain, he was always accessible to those who sought with sincerity for enlightenment, and the stores of his knowledge and of his experience were at the command of the humblest of those who asked for them. It was his privilege to complete the great work which he began, to build up from the foundation a system of asepticism which leaves nothing to be desired by those who have mastered the principles on which it rests, which has opened all the great cavities of the body to the healing hand of the surgeon, which has removed the pains or preserved the lives of countless thousands of sufferers in every portion of the globe, and which has raised English surgery to a pinnacle from which not even the presumptuous ignorance of politicians will be able to take it down. Our country has given to the world and to the profession the record of a stainless life, of an intellect at once brilliant and profound, of an industry which never wearied, of a courage which never failed; and these qualities, sufficient to constitute greatness in any department of human activity, were so combined in Lister as to justify our opening claim on his behalf. He was unquestionably the greatest Englishman of his century.

VIVISECTION

Report of British Royal Commission on Its Limitation.—The Royal Commission on Vivisection (*Lancet,* August 3, p. 346) which was appointed in September, 1906, presented its report early in the year; more than seventy meetings were held, and a great number of witnesses on both sides were heard. The allegations of some of the most active antivivisectionists were found to be "founded on misapprehension," and they have "either misapprehended or inaccurately described the facts of the experiments." The following paragraph summarizes briefly the spirit of the report: "We are compelled to accept the weighty evidence given before us to the effect that in some cases the study of animals experimentally infected with diseases has

given us knowledge which has been instrumental in preventing much suffering and mortality in both man and animals, and we believe that the discoveries thus already made justify the hope that by the same methods knowledge may yet be acquired regarding the means of preventing or curing other most painful diseases which are at present scarcely or not at all amenable to treatment. And finally we feel that as long as public opinion sanctions the infliction on animals of pain which is not only severe but of long duration,—in the pursuit of sport, and in carrying out such operations as castration and spaying, or the destruction of rabbits and of rats and other vermin by traps and pain-producing poisons,—it would be inconsistent and unreasonable to go further than we have already gone in limiting experiments which are designed to result, and according to experience will probably result, in alleviating greatly human or animal suffering."

As might be expected, the report suits nobody; the antivivisectionists consider it prejudiced and not in accordance with the evidence, while those who favor vivisection feel that the approval of it is not strong enough. The result of the work of this Commission will probably be that those who favored vivisection will continue to do so, and those who opposed it will continue to oppose it; but it puts a powerful weapon in the hands of those who consider that animal experimentation is a necessity.

THE TELEPHONE

Like all modern improvements, the telephone has its advantages and its disadvantages. While it no doubt often saves the busy doctor time, inconvenience, and fatigue, it subjects him to more wear and tear by the very readiness with which he can be reached, and often raises the perplexing question as to whether or not he ought to charge for services rendered over the telephone. The *Dietetic and Hygienic Gazette* discourses thus entertainingly on the subject (February, p. 68):

"Patients may visit with the doctor much more easily by 'phone than by older methods of getting about, especially at night; but, fortunately, this ability to talk to the doctor, behind his back, as it were, is not often abused. In fact, the nearness of the telephone, and so, the felt nearness of the doctor, has possibly made people less nervous over small matters, and they are less apt to rush for medical assistance at once on every occasion.

"This close communication has been of advantage to the physician long in practice, for, whereas in bad weather, night calls, and emergency cases, a doctor nearer at hand might have been called, the family physician now is reached by telephone. It saves trouble and time on the part of the patient.

"For the new practitioner, the telephone has hardly been a help. Besides the cost, which is as much for him as for the man who has been at work for forty years, we have already noted that the old-established doctor is more readily reached, and if not found, his patient learns where he is or when he will be in, and leaves a message for him to call later. The novice, therefore, finds less frequent opportunities for displaying his wares, and must bide his time accordingly. It used to be, and in many places is yet, the custom for city doctors to group themselves in one section or on one street, the object being on the part of the new man to possibly receive the call which would have gone to a neighboring physician had that neighbor not been out at the time. The telephone does away with this, for by 'wire' one can be reached as well in one place as another, and, as a consequence, practitioners are being more and more scattered as suits their convenience of living, and their place of congregation now is the telephone book instead of in 'Doctors' Row.' The only compensation for this change of conditions is that the busy practitioner can show his generosity by means of the telephone in handing over to a worthy aspirant calls that he does not wish to make, while the young doctor is more free to choose where he will hang his shingle.

"The telephone, then, does scatter doctors at the same time that it tends to centralize practice among the longer established. For the younger practitioner, the only remedy, when the lack of use of his 'phone gets on his nerves, is to grin and wait."

NOBEL PRIZE TO DR. ALEXIS CARREL

The Nobel Prize in Medicine for the year 1912 has been awarded to Dr. Alexis Carrel of the Rockefeller Institute in recognition of his work in the suturing of blood-vessels, the transplantation of organs, and the growing of tissues outside of the body; the value of the prize is about $39,000. This is the first time that it has been given for medical research done in America, although twice before received by men in this country for work along other lines. On the 10th of November in New York City before 4,000 people, President Taft, on behalf of the United States, publicly honored Dr. Carrel by his presence, and Monsieur Jusserand, the French Ambassador, delivered an address in which he placed Dr. Carrel on a plane with Pasteur for his services to mankind. On his return from abroad this distinguished French-American savant had an experience with the customs officer which points to the desirability of placing medical instruments on the duty-free list, for the practising physician as well as for our educational institutions.

MORBID ANATOMY

Sir James F. Goodhart in the Harveian Oration (*Lancet,* Oct. 26, p. 1129) spoke on the passing of morbid anatomy. It will be interesting to see who will take the place of the men trained in this phase of medicine, brought into such prominence by Virchow, Rokitansky, Ziegler, and others, when the present leaders have passed away. Many of them, with the keen eye of the morbid anatomist, are now the best clinicians of the day, and they would not have such clear insight into the nature of disease had they not spent many of their early years in the practical work of the post-mortem chamber. It now looks as though the laboratory worker of to-day is to become the skilled consultant of to-morrow. Some years ago, when all chemists were turning their eyes toward the wider domain of organic chemistry, we remember our teacher telling us that, as soon as this field should become sufficiently exploited, new secrets would be wrung from inorganic chemistry, and such has been the case. We predict that a few years more will show a return with renewed vigor to the field of gross morbid anatomy as found in the post-mortem room. The Associated Physicians of Long Island decided on October 7 to submit their own bodies to post-mortem examinations in order to overcome the baseless prejudice against this most useful and often only method of ascertaining the cause of death.

SPONTANEOUS GENERATION

Dr. Bastian, in his latest book on the Origin of Life (London, 1911), again asserts his belief in the production of life from inorganic material, and in his experiments with plant forms Stéphane Leduc (*Literary Digest,* June 8, p. 1201) has produced alleged living organisms which present the characteristics of life. It would seem, however, that neither Bastian with his silicious micrococci nor Leduc with his chemical "growths" has many adherents among scientists. Most of them think this "ghost" of spontaneous generation is formless and without flesh and blood. But now comes a real man of science, Prof. E. A. Schäfer, who in his presidential address before the British Association for the Advancement of Science, held at Dundee, discusses the possibility of spontaneous generation in these words:

> The possibility of the production of life,—*i.e.,* of living material,—is not so remote as has been generally assumed. Since the experiments of Pasteur,

few have ventured to affirm a belief in the spontaneous generation of bacteria and monads and other micro-organisms, although before his time this was by many believed to be of universal occurrence. . . . If the formation of life—of living substance—is possible at the present day—and for my own part I see no reason to doubt it—a boiled infusion of organic matter—and still less of inorganic matter—is the last place in which to look for it. Our mistrust of such evidence as has yet been brought forward need not, however, preclude us from admitting the possibility of the formation of living from non-living substance.

The wonderful strides made in the study of experimental physiology within recent years are well illustrated in the experiments of two Roumanian physicians, Athansius and Gradinesco, who removed the heart and striated muscles from a frog and subjected them to artificial circulation with Locke's sterilized serum (in order to replace the circulatory function of the blood) and kept the heart alive and pulsating for more than a month—thus proving what a "small part is played by albuminoid substances as sources of energy in muscular work." (*Cosmos,* Paris, September 26.)

DREAMS

An attempt has been made in the past year to interpret the character and to throw light on the health of the one dreaming from the nature of the dreams written down on awakening and then told later on to the physician. Sir G. H. Savage (*Bristol Medico-Chir. Jour.,* June, p. 15) believes that there may be a closer relationship between dreams and insanity than we have heretofore supposed and cites instances to show this connection. This type of warning of the onset of mania has been noted in several instances, and use may be made of the association by taking steps to place such patients under medical care before the actual onset of the mental breakdown. Melancholic patients, as might be expected, usually suffer from dreams of a depressing nature, and the appearance of more cheerful nightly visions is of good prognosis for the recovery of their mental balance. In some cases of mental defect vivid dream-fancies may persist as fixed hallucinations, and this is notably the case with erotic dreams in women; they may even give rise to false accusations of rape or indecent assault.—*Lancet,* July 6, p. 36.

EUGENICS

The *London Times* (July 25) has this to say editorially about the Eugenics Congress which was held at London during the summer:

This is an age of international efforts to deal with subjects of all degrees of importance. They ought to qualify the pessimism now perhaps rather too prevalent; for the organization of many workers from many lands ought surely to lead to the more prompt elimination of error, and to placing more powerful weapons in the hands of students. The International Eugenics Congress, which met at its inaugural dinner in London last night, is remarkable at the present day chiefly because Eugenics is a new science, still lacking the external embodiments and organization within the confines of particular countries which usually precede international discussion upon any considerable scale. It would seem that, apart from national conditions, there has been a general and remarkable awakening to consciousness that there is something wrong with modern civilization as a whole, whether we regard it in the older nations of Europe or in the younger ones of the Western Hemisphere. It may perhaps be argued that in some important respects the younger nations are really as old as the older, because at their foundation they simply adopted the old civilization as it stood at the moment, and under the influence of easy and frequent communications have developed it substantially upon the same lines as it has followed among the parent stocks. At any rate, there is a marked sameness in modern civilization everywhere, and a tendency to obliterate even the superficial differences of manners and customs which once lent greater variety to travel. It does not follow that any uniform treatment of social maladies by legislation could be attempted with success; nevertheless, the fact remains that modern civilization is everywhere very much in the same developmental phase. It appears to have everywhere made the same alarming discovery that it is in an unhealthy condition, from which nothing but extraordinary efforts can save it. We are even told with some confidence that upon the outcome of the studies which the Congress is meant to promote depends the answer to the question whether civilization is to go or to perish. We know that earlier civilizations have perished, perhaps in greater number than we have any means of estimating. It cannot, therefore, be held impossible that ours should go the way of many predecessors, and this reflection tends to aggravate the depression which some gloomy speculations naturally produce. That depression is not relieved by the fact, fairly apparent to the ordinary man, that if we have to depend upon Eugenics to stop our downward career we shall have to wait rather a long time for its practical remedies to operate. It is at present occupied in diagnosing the evil, but no one who has any notion of the mass of inertia of human nature can feel very sanguine about an early and effectual conversion of theory into practice.

Mr. Balfour, who brought his merciless logic into play last night, observed that the Eugenists must have the courage of their opinions. They may profitably consider the bearings of that saying. They are not the first people in the world who have tried to deal with the maladies of human society, and they will find in earlier experiments that it has been found necessary to resort to methods from which they would probably recoil in order to attain the ends to which their speculations point. The truth is that to play Providence to a race of men is rather a big undertaking. It calls for a far more drastic and thorough-going revision of accepted and cherished ideas than the Eugenists are apparently aware of. It cannot be securely based upon theories about somatic and germ cells, which by the way may be entirely superseded in a decade or two. Mr. Balfour puts his finger upon a weak spot when he points out that what man calls the fittest,

and what nature treats as the fittest, are two very different things. There is a good deal of argument at the present day which points to treating humanity upon the principles of the stud farm. But even in the stud farm the breeder's fittest is not the biological fittest. He breeds for certain qualities; and, just when he has got them in a high degree, Nature steps in with infecundity, and the breeder has to fall back upon some less perfected strain to keep the thing going. There is a norm for every living thing; and, though we may go a good way in modifying it for our purposes, the central type is always reasserting itself. We are trying the human organism rather high in these days, and we begin with the child, upon a theory which no breeder entertains—that every individual is as susceptible as every other of the kind of improvement that we desire. Perhaps a good deal of the degeneracy we hear about is simply the reaction from the attempt to produce the superman. The breeder's failures are covered up by summary processes. Our mistakes are not, but become the subjects of appalling statistics. It is an old saying that it takes many sorts to make a world, and Mr. Balfour puts the same thought in a more polished manner when he expresses scepticism as to whether any of us are really wise enough to know how a human society ought to be constituted, and what direction our efforts ought to follow when we presume to take the tremendous task in hand.

MORONS

From a eugenic, social, and economic point of view the morons (Howard A. Knox, Ellis Island, N. Y., *Jour. Amer. Med. Assoc.*, January 11, 1913, p. 105) and constitutional inferior types represent in common a latent or undeveloped moral tone, limited ability for coördinated and consecutive mental effort, erratic judgment, and inability to compete unaided in the struggle for existence. A moron may be defined as one who on reaching the age of puberty is mentally deficient, and remains so no matter how well developed he may become physically in after years. In other words, he acts the child throughout the entire course of his existence. Such neuropathic persons beget children of like type, too often due to near or remote consanguinity.

ARMY CANTEEN

The re-establishment of the army canteen in the United States has been urged by many military men ever since its abolishment, and this year a bill was actually introduced in Congress to bring this about: the interest to the medical man lies chiefly in its relation to the incidence of venereal diseases and alcoholism. Statistics have played a large part in the argument, and the same statistics, differently interpreted, have furnished ammunition for both sides of the question. Col. L. M. Maus, U. S. A. (*Jour. Amer. Med. Assoc.*,

January 13, p. 130), opposes in no uncertain terms the usual argument that when beer is not sold in canteens vile saloons and brothels spring up around the post, and in these the morals of the men are blunted and their health destroyed: he believes that the establishment of these bears no relation to the sale of beer, and cites statistics to show that the damage due to alcoholism and venereal disease was greater during the period when beer was sold than since that time. Surgeon-General G. H. Torney, U. S. Army (*Jour. Amer. Med. Assoc.,* January 20, p. 214), interprets the same statistics differently, and reaches the opposite conclusion,—that the abolition of the beer privilege in the canteen was undoubtedly injurious in its effect, and lessened to a considerable extent the attractiveness of the soldier's club, compelling him to go beyond the limits of the military post for amusement. As a result, the soldier is tempted to drink distilled liquors to excess in place of mild fermented liquors in moderation, and is, at the same time, brought into contact with disreputable companions of both sexes, with unfortunate consequences to his health and morals. L. L. Seaman, of New York (*New York M. J.,* February 10, p. 261), regards the abolition of the canteen as a blow at temperance, a direct incentive to drunkenness, and a flagrant means of spreading disease. He states that the medical and line officers of the Army, members of the leading medical associations of the country, and the wives of officers and enlisted men stand almost as a unit in favor of the restoration of the canteen.

It is to be hoped that the interest taken in this subject and its wide discussion will soon bring about a crystallization of public opinion which will either force the restoration of the canteen or put an end to the agitation.

PARATHYROIDS

Functions.—An excellent summary of our present knowledge of the functions of these glands appears in a paper by W. G. MacCallum, of New York (*Jour. Amer. Med. Assoc.,* August 3, p. 319). They were at first thought to be intimately related to, if not identical with the thyroid, but it is now well established that in anatomy and in function they are entirely distinct from any other organ. An animal from which these glands have been removed undergoes a gradual change in the excitability of the nervous system. This is shown

by muscular twitchings over the whole body; fibrillary contractions of the facial and laryngeal muscles, the latter producing stridulous breathing; stiffness of the muscles of body and limbs which renders the animal helpless; clonic contractions of the whole body with intense spasms. There are also paræsthesias, and sensory, alimentary, and vasomotor disturbances, as well as an underlying cachexia.

Experiments show that if the motor nerve supplying one of the tetanized muscles is cut, the muscle becomes flaccid, but the increased excitability of the nerve remains. If the blood-vessels of an animal in tetany are anastomosed to those of the leg of a normal animal, so that the nerves of that leg are bathed with tetany blood, the nerves become hyperexcitable like those of the tetanic animal. If these conditions are reversed, so that the nerves in the leg of an animal in tetany are bathed with the blood of a normal animal, their excitability returns to the normal. Therefore, some change in the circulating blood produces a change in the condition of the nerves; the chemical nature of this change in the blood is not known, but there is much to favor the view that it is produced by the withdrawal of a quieting influence from the nerve cells rather than by an active poison. The observation that withdrawal of calcium from a nerve cell, leaving a relative excess of sodium and potassium, renders the cell hyperexcitable is probably closely associated with this hypothesis, since the condition remains after removal of the parathyroids, and the tetany can be quickly relieved by the injection of calcium salts into the veins.

The function of the parathyroids can be replaced by administering an extract of the gland. The active principle is probably in the nucleoproteid which may be precipitated from the watery suspension by an acid. Good results are reported from the use of this material in human cases. After removal of the gland implantation has been performed, and the animals have continued alive and well, but died of tetany when the graft was excised; it has been found that the implanted gland will not grow unless the body is in actual need of the parathyroid function.

Sajous (*Monthly Cyclo. and Med. Bull.*, April) holds that these glands are the chief source for the elaboration of opsonins in resisting infections, and calls attention to the dangers of removing them in operations on the thyroid.

DISEASE IN GENERAL

Alternation of Diseases.—Dr. Pautrier, a recent French writer (*Revue des Questions Scientifiques,* January 20; see also *Literary Digest,* April 13, p. 749), believes that the old-fashioned idea that certain manifestations of disease on the surface of the body tend to relieve or to cure some internal disorder, as of the lungs or the intestines, has much to justify it. While admitting the fact of an exaggerated reaction against this old pathological generalization, he makes a plea for its partial rehabilitation, basing his claim on his own experiences. In one of these asthma alternated with eczema, and in the other erythrodermia and pruritis were, whenever treated, replaced by congestion of the lungs and albuminuria. He contends that the specialist should be first and foremost a physician, and he will then know that it is the defective general condition of the patient that requires treatment, and not merely the outward manifestations of eye, ear, or painful joint.

Life Waste.—Dr. Schlapp, of New York (*Outlook,* April 6), sounds a note of warning against the tension of modern life, and the perilous waste of energy it entails. He notes the physiological effects of overwork in mothers not only in a decreased birth-rate, but in an enormously increased number of mentally defective and delinquent children. He, however, predicts that the industrial monster that is lowering the status of our race will hold sway until an overburdened people can no longer endure the strain, and can put forth only so much effort as each day requires. With this will come leisure for peaceful pleasures, and a resultant rejuvenation of the race.

The Tonsils.—Mr. K. H. Digby (*Lancet,* January 20, p. 160) presents some interesting ideas on the protective function of the tonsils and other lymphatic glands, claiming that they protect the body against infections by the continual formation and absorption of autovaccines. Bacteria are attracted to the tonsils by positive chemotaxis and there destroyed; this results in the formation of antitoxins and bacteriolysins which are absorbed and thus protect the whole body against infection. In support of this he cites the frequent cases of tonsillitis occurring during scarlet fever epidemics, without rash or symptoms of general infection, which seem to confer immunity to scarlet fever. Peyer's patches are considered as serving the same

protective purpose against intestinal infections, and are often swollen during enteritis. The subepithelial glands are largest and most active during childhood, because at that period immunity to numerous diseases is being developed: in old age this function being no longer required, they atrophy. General enlargement of the lymphatic glands is the result of resistance to heavy and prolonged bacterial invasion: it is frequently associated with unsanitary conditions or lack of exercise.

HAIR

Mr. Charles Kassel (*Popular Science Monthly,* September) has made an interesting study of the color of the hair with relation to genius. While the color of the eyes of distinguished men is usually blue or gray, he finds that the hair is dark. There are of course exceptions to this rule, for Washington, Napoleon, Grant, Milton, Keats, Shelley, Longfellow, Stevenson, Parkman, are some of the light-haired celebrities which the author mentions. The fact that few biographers have paid much attention to this detail makes his conclusions, to say the least, tentative.

CHILD-SAVING EXHIBITIONS

In pædiatrics child-saving shows to teach the mothers what they can and cannot do have been very popular during the past year. Some of these exhibitions have instructed physicians, as well as the lay women as to the enormous advances that have been made in the feeding of infants and in the recognized modes of combating disease.

MEDICINE [1]

TYPHOID FEVER

The Efficiency of Preventive Inoculations.—Professor Chantemesse, of Paris, believes that enteric fever will gradually disappear during the present century, just as smallpox vanished in the nineteenth. This increasing confidence in the efficiency of preventive inoculation against typhoid and its widespread use are making necessary a revision of our whole conception of the disease, more especially of its diagnosis. The few cases appearing after the completed inocu-

[1] The order of the arrangement of the various diseases here followed is that of the International List of the Causes of Death.

lation seem to be marked by extreme mildness and the absence of the so-called "typhoid symptoms," such as carphologia, subsultus tendinum, and delirium. During an epidemic of typhoid fever in Avignon, France, the garrison of the town consisted of 2053 men, of whom 1366 were inoculated with a polyvalent antityphoid vaccine, leaving 687 unvaccinated. No untoward effects were produced by the vaccine. Among the unvaccinated soldiers 155 cases of typhoid fever, with 21 deaths, occurred, while among the vaccinated, who numbered twice as many, not a single case occurred. Both the vaccinated and the unvaccinated soldiers lived under exactly the same conditions, sleeping in the same rooms, drinking the same water, which was contaminated, eating the same food, and participating in the same manœuvres. It is also noteworthy that 841 of the soldiers were not vaccinated until the height of the epidemic, and in none was anything observed which could be described as a "negative phase." Some soldiers received one or two injections during the incubation period of typhoid fever, and in them the attacks were slight. It is noteworthy that the epidemic was severe; among the unvaccinated the morbidity and case mortality were high. Many of the vaccinated soldiers received only a single injection for various reasons, such as the exigencies of the service, indisposition of various kinds, or unwillingness to continue the treatment. The dose of antigen was therefore small and the immunizing power of the vaccine all the greater. Antibodies were produced in such abundance that the blood showed bactericidal qualities like those produced by an attack of typhoid fever. This mode of treatment is now mandatory in the United States Army, nearly 800,000 injections having been already sent out from Washington.

The Widal reaction has been found to be consistently positive for eighteen months or more, and during this period it has no value in diagnosis unless repeated tests show an increasing strength of agglutination. The eruption may be delayed or absent, and enlargement of the spleen is not always noted. (The technic of the inoculation was described in last year's article.)

The Skin Reaction.—There has been increased activity in the search for new methods of diagnosis and several new tests have been proposed. Prendergast injects a few drops of a dead typhoid culture

intradermally, raising a superficial bleb; after 24 hours a well-marked area of redness develops around the point of injection, unless the patient has typhoid, in which case there is no reaction.

The Ophthalmic Reaction.—C. R. Austrian, of Baltimore (*Johns Hopkins Bull.,* January, p. 1), has worked out an ophthalmic reaction, concerning which favorable reports have appeared. He claims that the results closely parallel those of the blood culture, and are more accurate than those of the Widal reaction. He uses as antigen a mixture of 80 different strains of *B. typhosis,* one drop being placed in the eye: the typical reaction appears in one to three hours and lasts from six to ten hours; it consists of injection of the blood-vessels of the conjunctiva of the lower lid, reddening of the caruncle, lachrymation and pus in the lachrymal sac. The value of these tests is as yet uncertain, and their behavior after preventive inoculation has not been stated.

Tenderness in the Region of the Gall-Bladder as a Diagnostic Sign of Typhoid Fever.—A. D. Radulesco and C. N. Atanassiu, of Bucharest (*La Presse Médicale,* November 30, p. 1004), have found tenderness in the region of the gall-bladder, with muscular resistance in the right hypochondrium, as one of the early signs in the diagnosis of typhoid fever. The signs occur in the first week of the disease, and gradually disappear unless there is a relapse, when the sign again appears.

Control examinations (*Lancet,* December 28) have been carried out on a number of patients suffering from other diseases; tenderness with resistance in the region of the gall-bladder was encountered in every case of right-sided pneumonia, and similarly in "asystole" and right-sided pleurisy; also in one case of puerperal fever out of five examined. Not unnaturally it was also noted in cases of gall-stone and cholecystitis. According to Radulesco and Atanassiu the liver should be thrust forward with the left hand (placed behind the patient, who is lying down), while firm but gentle and continuous pressure is exercised with the right hand, always from below upwards, through the anterior aspect of the right hypochondrium. If the patient be conscious he will complain of definite pain elicited by this pressure; if unconscious, the presence of tenderness is evidenced by muscular resistance and facial expression.

The Use of Eberth's Bacillus in Treating Typhoid Fever.—The

idea of using a killed or attenuated typhoid culture, or typhoid antigen, in treating the disease was the immediate result of our knowledge of its efficiency in increasing resistance to infection, and in consequence of considerable favorable experience, the procedure is now recognized as of value. F. J. Sadler (*Quart. Jour. Med.,* January, p. 193) feels that he would not be justified in withholding the vaccine treatment from any case of typhoid: to the average adult, seen within the first 14 days, he gives a dose of 2,000,000, and recommends at least one reinjection given on the fifth following day. Callison (*Am. Jour. Med. Sci.,* September) has used the method in 38 cases with an unusual absence of complications; he gives an initial dose of 500,000,000 and repeats it at four-day intervals as long as required, increasing by 100,000,000 at each dose; he uses a stock vaccine, considering it equally as effective and less toxic than the autogenous. Chantemesse has used a serum prepared as is diphtheria antitoxin, and in 1,000 cases had a mortality rate of 4.9 per cent., while in the same epidemic, those who followed the usual routine had a death-rate of 17 per cent. Further work along this line will standardize the dose and the method, and a very valuable and practical method of treating the disease may reasonably be expected to develop.

Typhoid Carriers.—The importance of the typhoid carrier in the dissemination of the disease having been appreciated, several methods of freeing him from the bacillus have been studied. Some of those affected have been relieved by draining the gall-bladder, while others have been cured by preventive inoculation. Johnston (*Jour. Med. Research,* November) has succeeded in producing the carrier stage in rabbits, and with this source of material for study the best method of dealing with these cases should soon be worked out.

Diet.—Since Coleman and Shaffer demonstrated the advantages of feeding typhoid patients liberally, many others have confirmed their results. Some hospitals are now giving diets designed to furnish 3000 to 4000 calories daily, and it has been found that emaciation is slight or absent, relapses are relatively infrequent, and the period of convalescence is considerably shortened. Du Bois (*Arch. Int. Med.,* September 15) has made a careful study of metabolism in typhoid, and concludes that throughout the disease patients can absorb carbohydrates and proteins as well as healthy individuals;

they can take up very large amounts of fat, but the per cent. of absorption is somewhat lower than normal. The stools of patients on the high calory diet very closely resemble normal stools. Careful selection of the diet is essential in order to maintain metabolic equilibrium, and here there is much difference in opinion, Coleman and others giving considerable protein while some reduce it; thus, Surgeon W. M. Garton, U. S. N. (*Va. Med. Semi-monthly,* June 21), employs a minimum nitrogenous diet, providing 2000 to 3000 calories, which is designed to maintain nitrogen equilibrium, limit putrefaction, and be easily digestible as well as palatable. Writers on this subject are now practically unanimous in the opinion that judicious liberal feeding gives better results than a very limited diet.

PARATYPHOID FEVER

Prof. F. A. Bainbridge (*Lancet,* March 16, p. 705), in the Milroy lectures, points out that, although the clinical features of meat poisoning and paratyphoid fever differ widely, yet the diseases may be found to resemble each other more closely than is now supposed, from the fact that they are caused by closely allied organisms.

TYPHUS FEVER

Brill's Disease as a Form of Typhus.—When Nicolle, in 1909, demonstrated that the chimpanzee could be inoculated with typhus, he paved the way for the first real advance in our understanding of the disease since Gerhard demonstrated the difference between typhus and typhoid. For the knowledge that the disease still exists in this country we are indebted to the close observation of Dr. N. E. Brill, of New York, who, in 1911, reported several cases of a new disease which in some respects resembled typhus. Early in 1912 Anderson and Goldberger (*Public Health Reports,* February 2) demonstrated by inoculation experiments that the condition really was typhus in a mild form, and that this disease was not merely of historic interest, but was endemic in the United States. While Dr. Brill (*Med. Record,* June 1, p. 1037) does not concede that their evidence as to the identity of Brill's disease and typhus is conclusive, we believe that it is generally accepted as being so. The studies of Anderson and Goldberger (*Hyg. Lab. Bull.* No. 86, October; see also *Med.*

Record, May 18, p. 962) show that the rhesus monkey can be infected by inoculation with blood from a case of Brill's disease, and after recovery is immune to reinfection, also to infection with virulent blood from a case of typhus. Monkeys which have recovered from infection with typhus are likewise immune to infection with Brill's disease. Attention is called to the fact that though the disease in New York and other cities is mild, and has shown little tendency to spread, it is apparently on the increase, and may possibly acquire virulence and epidemic prevalence.

Transmissibility of Typhus.—Further work by the above investigators shows that the body louse may become infected with typhus; the virus is carried in the body of the louse, and is transmissible by the subcutaneous injection of the crushed insect or by its bite: the same is true of the head louse. The virus of typhus is found also in the circulating blood of the monkey, and is present in the serum after separation, but probably cannot pass through a Berkefeld filter, although it may possibly do so in the form in which it appears in the louse. The virus is deprived of virulence by drying, also by heating at 55° C. for 15 minutes, or at 60° for five minutes, but may retain its virulence after heating at 50° for forty minutes; it also retains its virulence after freezing for at least eight days.

Immunity to Typhus.—Immunity in monkeys after recovery from the disease may last at least two years, and a certain proportion of monkeys show a natural immunity. The guinea pig is susceptible to infection, and is also immune after recovery. Immunity after recovery is specific. It has also been found that typhus immune serum obtained between the fifth and fourteenth days of convalescence has protective value when the injection is simultaneous with, or within 48 hours after, inoculation with the virus, while that obtained on the thirtieth day of convalescence has no appreciable protective influence. The buccal and pharyngeal secretions of typhus patients were found not to be infective; therefore, droplet infection plays no part in the transmission of the disease. The therapeutic value of immune serum is at present of no practical importance.

MALARIA

Malarial Plasmodia.—Successful cultivation of malarial plasmodia is reported by Bass (*Jour. Amer. Med. Assoc.,* September 21).

He uses as a medium Locke's fluid from which calcium chloride is omitted, and to which dextrose is added. The plasmodia grow in a thin layer near the top of the cell sediment, and develop in the red corpuscles, apparently digesting the substance of the cells; they are destroyed by the leucocytes as soon as they are liberated from the erythrocytes. Segmentation can be seen in the cultures; the asexual cycle alone has been observed. This work has been confirmed by C. H. Lavinder (*Jour. Amer. Med. Assoc.,* January, 1913), who found that rosettes developed after about 30 hours; phagocytosis and mobility were observed, but amœboid movement was not prominent.

SMALLPOX

Iodine in Smallpox.—The sterilizing action of iodine on the skin has been utilized by C. S. Rockhill, of Cincinnati (*Jour. Amer. Med. Assoc.,* January 27, p. 273), in smallpox with asserted good results. The pustules are opened and painted with 10 per cent. iodine in glycerin two or three times daily with the result that they dry up, toxic absorption ceases, tissue destruction stops, and disfigurement is averted. He states that eighty-five patients were treated by this method, and all of them recovered. The average stay in the hospital was only twelve days.

MEASLES

Experimental Measles in Monkeys.—Lucas and Prizer (*Jour. of Med. Research,* April) have produced measles in monkeys by inoculating them intracerebrally and intraperitoneally with the blood serum from a patient 36 hours after the initial rise of temperature and six hours before the appearance of the rash. The incubating period in the monkey was six days, at which time systemic symptoms developed. The Koplik spots were easily recognized on the tenth day. There was an erythema of the face and forehead, but no characteristic rash. During the pre-eruptive state there was a leukopænia, which involved the polymorphonuclears, lymphocytes, and large mononuclears.

SCARLET FEVER

Inoculation.—C. Levaditi, of Paris (*Presse Méd.,* August 24, p. 701), and others have studied the disease by inoculation in apes,

and the filterable virus has been found in the tonsils and tongue, as well as in the various fluids of the body.

A Diagnostic Sign.—The tourniquet sign appears to be of some value in the diagnosis of early cases of the disease. This test is made by placing a tourniquet around the arm; if positive, petechiæ or minute hemorrhages appear below the band, particularly in the bend of the elbow. It is quite constant in scarlet fever, and has been found in some cases of measles, diphtheria, tonsillitis, nephritis, heart disease, syphilis and other conditions.

Leucocytic Inclusion Bodies in Scarlet Fever.—The leucocytic inclusion bodies found in scarlet fever subjects, and described by Döhle of Kiel in 1911, have been noted by several observers to be almost universally present in cases of this disease; they are generally found in the polymorphonuclear leucocytes, and, in fresh cases, in practically every one of these cells. According to J. A. Kolmer, of Philadelphia (*Am. Jour. Dis. Children,* July, p. 1), they are present in the leucocytes in 94 per cent. of all cases during the first three days but subsequently diminish, and after the ninth day are seldom found. The claims at first made,—that they are pathognomonic of scarlet fever,—have been disproved by finding them in cases of diphtheria, streptococcus infections and other febrile diseases, and possibly in health. They are not generally accepted as being a cause of scarlet fever, but rather as a part of its pathology.

Serotherapy.—A serum for the treatment of the disease is in use in Vienna and, according to Schick (*Therap. Monats.,* April) has distinctly lowered the death-rate. It consists of streptococci obtained by culture from the heart blood of persons who have died of the disease; it is grown on bouillon, and injected into horses. The dose for a child of over 18 months is 200 c.c. This serum is not standardized, and is probably of little use if given after the third day of the disease.

Kidney Complications.—According to Bichler (*Arch. de Méd. des Enfants,* October), the kidney complications of scarlet fever are best averted by placing the patient on a strictly milk diet free from salt; he continues this until the fever drops, and then gives a mixed diet without meat until the end of the fourth week. His statistics of groups on different diets show a much lower per cent. of nephritis among those on the milk diet than among those on mixed diets.

PERTUSSIS

Vaccine Therapy.—A vaccine has been prepared by M. Ladd (*Arch. Pediatrics,* August) from the coccobacillus discovered by Bordet and Gengou, and has given results sufficiently encouraging to justify further experiments in its use. It was used in nine cases, all showing characteristic paroxysms and increase in the number of mononuclear cells; doses as high as 40,000,000 were given to the infants at intervals of five days without harmful results. No other treatment was given, and most of the cases were distinctly improved after the third injection; all of the cases recovered. The average duration of the disease was five weeks after commencing the injections. J. Zahorsky (*Interstate Med. Jour.,* October) has also had good results with this method.

DIPHTHERIA

Treatment.—M. Rendu, of Lyons, France (*Bibliothèque Universelle et Revue Suisse,* May), advocates hot air in the treatment of diphtheria, not to take the place of antitoxin, but to supplement it. He finds that the bacillus of diphtheria, if exposed to a temperature of 80° C., is killed in one minute, and that this temperature can be easily borne by the patient without injury to the mucous membrane or to the throat.

Death following a Protective Dose of Antitoxin.—Twelve hundred units of antitoxin administered by a medical inspector of the Board of Health as a prophylactic caused the death of a patient, aged 21, recently in Philadelphia. As he suffered from asthma, this adds another fatality to those affected with this disease, to whom the administration of antitoxin has given rise to a fatal issue.

Staining Diphtheria Bacilli.—A new technic in staining the diphtheria bacillus with toluidin blue is described by C. Ponder (*Lancet,* July 6), who thinks it of value because the characteristic morphological features of the organism are accentuated when it is mounted in the stain itself after the method of Cobbett. The stain is composed of toluidin blue (Grubber), .02 Gm., glacial acetic acid 1 c.c., absolute alcohol 2 c.c., distilled water to 100 c.c. A thin film is made on a cover glass and fixed in the usual way, a small quantity of the staining fluid is spread thinly over the film and the cover

glass is then mounted as a hanging drop preparation, to be examined with the one-twelfth objective in oil. The examination should be by strong artificial light, not daylight, such as a 16 c.p. frosted globe light at a distance of 6 to 8 inches from the mirror; the thin layer of this fluid corrects the yellowness of the artificial light.

Different organisms take the stain in characteristic ways, thus certain cocci do not stain at all and are seen as oval glistening bodies; other cocci and bacilli (including the organisms of Vincent's angina) take a light or dark blue; others, B. subtilis for one, take a bright pink; B. diphtheriæ stains a pale glistening blue with red metachromatic granules, an extremely characteristic appearance and in strong contrast to other organisms present.

CHOLERA

Hypertonic Salt Injections.—Major Leonard Rogers' treatment of this disease in Calcutta and Palermo with hypertonic salt solution was discussed in last year's article (see also *Lancet,* November 23, p. 1424). Further work along this line by Rogers and Bishop (*Indian Med. Gazette,* April 12) has shown that the specific gravity of the blood and the blood-pressure are valuable indications for the use of the method; the injection should be begun as soon as the pressure falls below 70. Bishop favors the intraperitoneal method, by a cannula inserted just below and to one side of the umbilicus, the fluid being introduced at the rate of a pint in 4 to 5 minutes.

Complement Fixation Test.—Connio (*Gaz. d. Osped. ed. Clin.,* December 21) reports an accurate and reliable complement fixation test, using the fresh stool, after heating it to 60° C. for twenty minutes.

BUBONIC PLAGUE

The appearance of bubonic plague in Cuba and Porto Rico would seem to indicate that the course of the disease is not westward but eastward. This is an additional reason for keeping our cities free from rats, by whom, as we all know, the infection is spread. The recent rat-killing campaign in California has demonstrated that it is no easy matter to rid a town of the vermin in the absence of a Pied Piper. Nevertheless, there are means at the disposal of the health authorities which, if vigorously applied, must certainly reduce to a

minimum the danger of introduction of the disease. That the danger of an epidemic of plague sweeping the United States is very real is shown by H. D. King, of New Orleans (*Jour. Amer. Med. Assoc.*, July 27, page 237), who recommends prevention by the destruction of all possible carriers and constant watchfulness, especially after the opening of the Panama Canal.

An effective device for keeping infected rats away from ships lying in ports as well as preventing rats getting ashore from infected ships is the rat guard—a metal disc strung onto the hawser of vessels has proved satisfactory.

Examination of Rats for Plague.—Dr. G. W. McCoy (*Public Health Reports*, July 26) gives the technic for the examination of rats for evidence of the plague. He quotes the Indian Plague Commission to the effect that the naked eye is markedly superior to the microscopic method in the diagnosis, for in all except a few atypical cases the plague lesions are characteristic. The most noticeable post-mortem appearance is the engorgement of the subcutaneous blood-vessels, together with a diffuse pink color of the subcutaneous muscles, which have a peculiar dry, waxy translucency, usually distributed over the whole surface of the body but occasionally confined to the side on which the primary bubo is found. The bubo, when present in typical form, is sufficient for diagnosis. Marked injection surrounds it and sometimes there is hemorrhagic infiltration. The gland itself feels firm but is usually caseous or occasionally hemorrhagic. In the liver an apparent fatty change is encountered, which is found to be due to necrosis. White spots of the size of a pin-point are sometimes found which give the surface of the organ a stippled appearance as if dusted over with gray pepper. The spleen is markedly enlarged, firm, friable, rather dark in color, and occasionally presents small granules under the capsule. Pleural effusion is a sign of great importance when associated with other suspicious lesions. It is serous in character, usually clear, though occasionally blood-stained. Effusion is rare in other diseases in rats. Plague infection may be present without recognizable gross lesions, perhaps once or twice in 100 cases. Inoculations in such instances may demonstrate *B. pestis*. Microscopic examination, in doubtful cases, is important, as is the making of cultures. The method of examination is as follows: The rats are immersed in any convenient antiseptic to kill fleas and other

ectoparasites. They are then nailed by their feet to a shingle and the skin is reflected from the whole front of the body and neck so as to expose the cervical, axillary and inguinal regions. The thoracic and abdominal cavities are then opened with scissors. Careful search for buboes should be made in the regions of the various peripheral lymph-nodes, and the lungs, liver, spleen, etc., examined for the signs mentioned above.—*Jour. Amer. Med. Assoc.,* August 17.

Dissemination of Bacilli in the Pneumonic Type.—The fact that the pneumonic form of this disease can be directly transmitted from man to man without an intermediary assumes great importance when it is considered that in the recent epidemic in North China the cases were almost universally of the pneumonic type. R. P. Strong and Oscar Teague, of Manila, P. I. (*Phil. Jour. Sci.,* June, p. 137), have shown that the bacilli may be disseminated in large numbers by the act of coughing, and that the respiratory tract may be directly infected by this means. They state that in no other disease is the patient so dangerous to others or the risk of droplet infection so great, since the number of bacilli expelled by coughing greatly exceeds that in other respiratory diseases. Attention is called to the necessity of protecting attendants by gowns, masks and glasses. The bacilli do not survive drying, and therefore are less dangerous in a hot, dry climate than in a cold climate such as that of North China.

LEPROSY

Bacteriology.—In last year's article we mentioned the work of Dr. G. B. Crow, U. S. N., who showed that the bacillus of leprosy was present in the circulating blood of lepers; this has been verified by A. J. Smith and D. Rivas (*New Orleans Med. and Surg. Jour.,* October), who also cultivated the organism through four generations. In the blood were found lepra cells full of acid-fast bacilli, and these bacilli were frequently noted to be phagocytized by lymphocytes and endothelial cells.

Dissemination of Germs through Laboratories.—Cold-blooded animals are more readily inoculated with cultures of bacillus lepræ than the warm-blooded, which supports the contention of Sir Jonathan Hutchinson that the use of fish as food is the source of the disease. We cannot permit this opportunity to pass without calling attention to the loose and lax manner in which some of the experiments in

regard to the inoculation of fish and other cold-blooded animals with the leprosy bacillus have been carried on; and it is a grave question whether or not certain of our laboratories are not now laying a basis for the propagation of certain virulent diseases by the study of their pathogenesis,—a propagation which could not occur were it not for the introduction of the organisms by means of specimens sent from one country to another.

Treatment.—L. B. Scott (*Indian Med. Gazette Adv.,* August) has used nastin in the treatment of 35 cases of this disease, and he reports that almost every case markedly improved; in some of the milder ones all signs of the disease disappeared. The permanency of the cure is still undetermined. (See also *Lancet,* March 30, p. 881.)

Leprosy in Rats.—Rat leprosy and the disease which attacks human beings now appear to be closely allied, if not identical. The pleomorphous character of the organism must be borne in mind. Those interested in this subject will find valuable information in the annual report of Dr. J. Ashburton Thompson, Chief Medical Officer of the Government of New South Wales, and of Dr. Couret, of Tulane University in New Orleans.

FILARIASIS

Calabar Swelling.—Dr. R. T. Leiper (*Lancet,* January 11, 1913) announces that the metamorphosis of the *Filaria loa* of Calabar, West Africa, has been shown to take place in the salivary glands of a fly of the genus *Chrysops.* The embryos of this filaria, called *Microfilaria diurna,* are found in the blood only during the daytime. It is important to note that Sir Patrick Manson, many years ago, surmised that the nocturnal periodicity of the *Filaria bancrofti* pointed to a nocturnal blood-sucking insect as an intermediary host, and proved that this intermediate host was found in a certain species of mosquito.

GAPES IN MAN

Dr. R. T. Leiper (*Lancet,* January 18, 1913, p. 170) received a specimen of *Syngamus* said to have been coughed up by an inhabitant of St. Lucia, West Indies, who noticed that after expelling the worm a cough which had previously existed almost disappeared. As is well-

known, *Syngamus trachealis* is a parasite exceedingly common in poultry and game birds, and it seems strange, considering the enormous annual mortality among chickens from the presence of this parasite, that no cases of infection in man are recorded. It is suggested, however, that Dr. King, to whom the worm was brought by the woman who coughed it up, might possibly have been misled by a neurotic patient.

TETANUS

Intravenous Injections of Paraldehyde and Ether Followed by Injections of Normal Saline.—Dr. Oliver Atkey, of Khartoum (*Lancet,* January 18, 1913, p. 168), reports a tuberculous subject who developed signs of tetanus, and, in order to produce muscular relaxation, paraldehyde and ether were injected, and followed by copious injections of saline solution; in all, 187 c.c. each of the paraldehyde and ether were used. This treatment was kept up for eight days. The largest dose administered was 30 c.c. each of paraldehyde and ether, and 2 litres of saline solution. After the discontinuance of the paraldehyde infusion, a mixture of chloral and bromide was employed. The tuberculous sinuses of the neck were opened during the injections, and healed a month later. The special advantages of this method of treatment appear to be the extreme rapidity with which anæsthesia is produced, the patient having exhibited not only the anæsthetic effect of the drug, but hypnosis lasting several hours. After the effects have passed off, there is on waking a period of relaxation and comfort, during which nourishment can be administered and the wants of nature attended to.

SPOROTRICHOSIS

Bacteriology.—A brief summary of our present knowledge of this disease, over two hundred cases of which have been reported, is given by W. W. Hamburger, of Chicago (*Jour. Amer. Med. Assoc.,* November 2, p. 1590). There is evidence that it is not merely a local skin affection but may, like other granulomas, become a generalized systemic infection, the sporotrichium having been found in muscles, joints, bones, kidney, lung and the blood by cultures. The disease is probably widespread and prevalent, particularly in agricultural districts, and the cause of many unhealed chronic ulcerative processes

to which various names have been applied. The disease may appear in several forms and Hamburger gives Beurmann's classification:

1. Localized sporotrichosis with sporotrichotic chancre and lymphadenitis with ascending lymphangitis.

2. Disseminated gummatous sporotrichosis; multiple subcutaneous nodules without ulceration, at first hard painless masses, later cold abscesses.

3. Disseminated ulcerative sporotrichosis; multiple polymorphic ulcerations.

4. Extracutaneous sporotrichosis; localized in bones, mucous membranes, muscles, joints, kidney or lung.

The following are the important points in diagnosis:

Clinical; the occurrence in farmers, fruit dealers or handlers, berry pickers; a history of trauma succeeded by the insidious onset and slow progress of the ascending infection following the course of the lymphatics; the production of small, hard subcutaneous nodules which develop into soft cold abscesses or ulcers; the protracted course of the disease with only slight pain or fever and little effect on the general health.

Laboratory; the local and general eosinophilia and the cultivation of the organism on suitable media. The growth is characterized by its slow initial appearance, eight days may elapse before it becomes visible; it grows readily on 2 per cent. glucose agar. In the microscopic picture the branching septate mycelium and pear-shaped spores are characteristic.

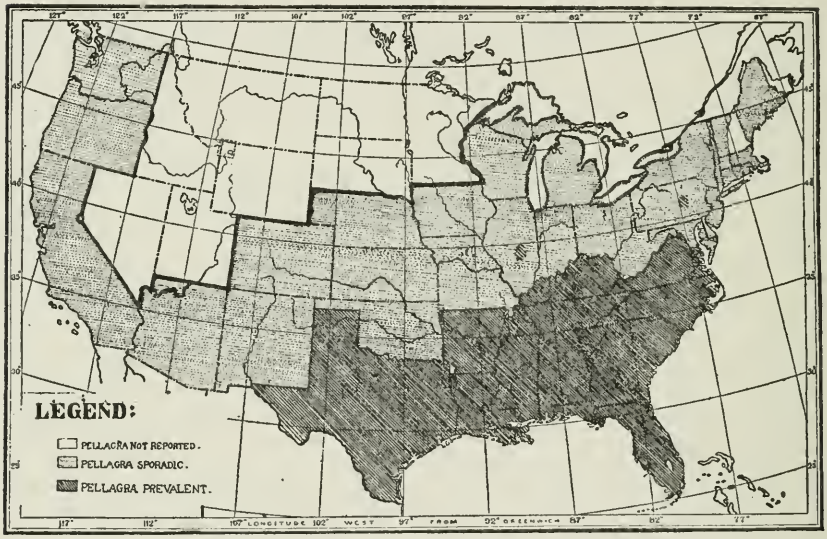
The following treatment has proved successful; potassium iodide in increasing doses up to 6 Gm. per day or more; locally, a solution of potassium iodide 10 Gm., iodine 1 Gm., water 500 Gm.; the ulcerations should be touched with tincture of iodine. The treatment should be continued for at least a month after apparent recovery.

PELLAGRA

History.—Under the direction of the Treasury Department of the United States, Surgeon C. H. Lavinder, of the Public Health Department, has just published (January, 1913), a map showing the prevalence and geographic distribution of pellagra. A comparison of this map with the one prepared by Dr. George A. Zeller for the March, 1911, issue of the International Clinics, which covers the spread

of the disease well into 1910, will show the continually increasing area in which pellagra is found. It is appalling to think that a disease, practically unknown in America until about six years ago, has already attacked not less than 30,000 persons, with a case fatality exceeding 39 per cent.! We are here dealing with a subject of such international importance that every one should lend his aid to the eradication of this dread malady, the cause of which is still unknown. At the National Association for the Study of Pellagra held in Columbia, S. C., early in October, some remarkable results from medical treatment were reported, but the general impression pre-

Fig. 1.



vailed that drugs had little effect on the progress of the disease, and, at this time, the factors generally productive of the best results are rest, diet, hydro- and psychotherapy, and such symptomatic remedies as the case may demand.

Etiology.—In the meantime, our knowledge of the course and treatment of the disease increases but slowly, and the year's developments have been largely in the direction of casting doubt on our former conceptions. The report of the Illinois Pellagra Commission (*Arch. Int. Med.,* August, p. 123, and September, p. 219) is one of the most important of the studies on the subject which have appeared

during the year. The theory, proposed by Sambon, that the infectious agent is carried by the sand-fly (*Similium reptans*) was studied, but no confirmatory evidence was adduced. Anaphylaxis in response to extracts of corn was not observed, and this casts doubt on the claims of Volpino, of Turin, that the anaphylactic reaction is of considerable value in the diagnosis of pellagra. Feeding experiments of a year's duration brought out nothing to support the idea that the disease is due to an excess of corn in the diet. Efforts to find a blood parasite were alike unsuccessful. Some of the other observations may be of positive value: a change from the normal intestinal flora was noted, some forms of bacteria not usually present, as well as amœba and flagellates, being common. The Commission concludes that the disease is infectious, and is due to an organism which, possibly, has its seat in the intestinal tract.

BERIBERI

Polished and Undermilled Rice.—The continued absence of beriberi among Philippine Scouts is ascribed by the U. S. Army Board for the Study of Tropical Diseases (*Military Surgeon,* v. 30, pp. 312, 409, 675) to changes in the ration, namely, the substitution of undermilled rice for the polished, a reduction in the amount of rice, and the addition of a legume. Experiments on polyneuritis gallinarum in fowls have shown that the disease can be cured or prevented by the administration of an extract of rice-polishings. This extract was given in fifteen cases of infantile beriberi with the result that prompt and complete recovery followed in every case. It was at first thought that the phosphorus in the polishings protected against the disease, but it is becoming evident that the phosphorus indicates the presence of the protective substance instead of being itself that substance.

TUBERCULOSIS

Bovine Tuberculosis.—The most important Congress on Tuberculosis held during the past year was that at Rome, in April, 1912, special interest having attached to that bone of contention, the human and bovine varieties of the disease. The British Royal Commission was represented by Prof. G. Sims Woodhead, of Cambridge (*Lancet,* June 1, p. 1451), who suggested that existing conditions were dissimi-

lar in various countries, and that, as the methods used in these investigations by the various laboratory workers have differed, the consequent want of uniformity in the results obtained would be obviated by rigid adherence to a set technic.

Prophylaxis.—The stamp of approval was set upon the following statements: First, prophylaxis against tuberculosis must have for its principal object supervision of the contagion from man to man, and especially in the family. Second, infection of man by the bacillus bovinus is less frequent than infection from man. Attention was called to the question of destroying tuberculous carcasses, and to the harm done by supplying milk from tuberculous cows.

Calmette, Landouzy and others took a prominent part in the discussion. The use of tuberculin and the various modifications of the tubercle bacillus continue to gain favor in the treatment of tuberculosis, but it is not to be expected that the use of tuberculin alone will give brilliant results unless combined with every other known means of combating the disease. Injections must be numerous and the care of the patient such as can be ordinarily given in the sanatorium alone. It is no longer necessary to send a patient away from his native place in order to have him treated for consumption, for equally good results seem to be obtained whether the sanatorium selected be at the sea-level or at a high altitude.

It is now generally believed that from 2 to 10 per cent. of the fatal cases of tuberculosis occurring in children are of the bovine type. Dr. Park, of New York, considers that 300 children die in New York alone every year from this mode of infection. Dr. Mazyck P. Ravenel, of Wisconsin, at the Sixth Annual Meeting of the American Association of Milk Commissioners, found that of 787 adults examined 777 showed human, and ten bovine, infection; in children from 5 to 15 years of age, of 153 cases examined, 36 were found to be of the bovine type; often there is a mixed infection present.

Bacillus in Perspiration.—Piery, of France, has found tubercle bacilli in the perspiration of tuberculous patients, and concludes that the disease is transmissible by direct contact. He supports this theory by the view that "the elimination of the tubercle bacilli through the sweat is connected with the frequent septicæmic nature of the tuberculous infection."

Classification of Cases.—Dr. A. C. Inman (*Lancet,* April 13, pp. 975, 1002) has divided cases of tuberculosis as follows:

Group 1.—Resting febrile.

Group 2.—Ambulant febrile, resting afebrile.

Group 3.—Ambulant afebrile.

Group 4.—Working afebrile.

This is an admirable method of classifying cases for publication or for future reference. Even the existence of the tuberculosis bacillus has been vigorously attacked by various observers, one of them claiming that by the simple manipulation of tuberculin rod-shaped masses resembling the tubercle bacillus may be obtained.

Avirulent Tubercle Bacilli in the Treatment of Tuberculosis.—Dr. F. F. Friedmann of Berlin advocates the special treatment of tuberculosis by the injection of tubercle bacilli passed through turtles until the organisms have been rendered totally innocuous for guinea-pigs, while containing the antigens so necessary for the treatment of tuberculosis. Dr. Friedmann has already treated 1,200 cases of tuberculosis by this method, and has drawn remarkably favorable conclusions from his case histories; but while his report, read before the *Berlin Medical Society,* on November 6, attracted much attention in the lay press, it has been vigorously assailed by numerous medical men as being unscientific and misleading. It is to be hoped that both Piorkowsky, who has another strain of avirulent bacilli, and Friedmann will give their organisms over to a competent bacteriological institute for study, and that all communications to the lay press may be withheld until an official report is laid before some scientific meeting of medical men.

It is stated in the daily press that a New York millionaire has offered Dr. Friedmann $1,000,000 if he will cure 95 out of 100 cases of tuberculosis; the offer has been accepted and he is now (February 1) on the way to New York to carry out the test. The judges are to be prominent physicians of the United States.

Sanitarium Treatment.—An experiment on a large scale is now being tried in England in regard to the institution of sanitarium benefit under the new National Insurance Act. It alone will decide as to the efficacy of this or any other method in which large sums of money are expended by the State for the good of the public at large.

In volume two of the twenty-first series of the INTERNATIONAL CLINICS, Dr. Lawrence F. Flick gives some valuable data in regard to the tuberculosis campaign in Pennsylvania up to 1911.

The Fixation of Complement Test in Tuberculosis.—This subject is receiving much attention here and abroad, and while an entirely satisfactory antigen has not yet been obtained, sharply positive results are frequent and the quantitative clinical findings obtained with the reactions will, no doubt, prove of value in future studies of tuberculosis.

Experiments at the Adirondack Cottage Sanitarium (*Jour. Med. Research,* November, p. 163) were conducted with human tubercle bacilli derived from four patients in moderately advanced stages of tuberculosis as an antigen and of 85 tests made with the sera of 34 patients, complement fixation was obtained in 24 cases.

In England, stock (dead) tubercle bacilli seem to have proved the most satisfactory antigen, and in the experiments described by Mr. Leonard S. Dudgeon, W. O. Meek, and H. B. Weir (*Lancet,* January 4, 1913, p. 19) this was so constantly employed as to be regarded as a standard. The test was applied in 131 cases of pulmonary tuberculosis of all degrees of severity, the patients being divided into groups: (1) Those undergoing treatment other than by tuberculin injections; (2) those receiving injections of tuberculin or dead tubercle bacilli; and (3) "arrested" cases living an ordinary life under healthful conditions. The reaction was positive in 109 cases.

The advantages of this method of blood examination, it is claimed, depend upon the estimation of the "intensity" of the reaction, and there is "a definite, favorable, quantitative relationship between antigen and antibody; excess of either constituent is unfavorable to the fixation of complement."

The tests for "intensity" were made with sera and antigens in varying degrees of strength. In one group the reaction was "weak" and fixation of complement occurred only with both serum and antigen at full strength. The reaction was "strong," and fixation took place with diluted serum and strong antigen, as well as with dilutions of antigen with diluted serum. A "medium" reaction was obtained in those cases which gave a positive intermediate reaction between the two other groups. The "intensity" of the reaction seems to bear no relation to the degree or to the chronicity of the

disease. In some instances of extreme toxic and almost moribund cases the reaction was slight or nil, while again it was powerful in other cases with similar clinical manifestations. On the whole, however, the reaction was weak.

Albumin in the Sputum of Tuberculous Patients.—S. Pindborg (*Hospitalstidende,* October 16 and 23, also *Jour. Amer. Med. Assoc.*) finds albumin to be present in the sputum in all cases of active pulmonary tuberculosis, the relative amount seeming to be in direct proportion to the intensity of the tuberculous process. The sputum is simply mixed with an equal part of water, agitated, and filtered, and a test made by the use of acetic acid in the same manner as for finding albumin in the urine. In 25 febrile cases the amount averaged 4.3 per cent. per thousand. This test, taken in connection with the von Pirquet reaction, justifies one in making a positive diagnosis. It must not be forgotten, however, that albumin may also be present in the sputum in other pulmonary affections, such as pneumonia, œdema, pleurisy with effusion, and emphysema with dilatation of the heart.

Treatment of Pulmonary Tuberculosis by Artificial Pneumothorax from the Use of Nitrogen.—Professor Carlo Forlanini, of Pavia, in 1894 drew attention to a treatment of pulmonary tuberculosis which in well-selected cases skilfully operated upon has given most favorable results. Thus, Claude Lillingston (*Lancet,* December 14, p. 1642, also p. 1669) reports a series of 18 patients so treated, covering periods after the operation of from six months to three and a half years. In all of these cases the prognosis was bad, the disease being advanced and active. Yet in 13 of them its ravages were either arrested or undergoing arrest, leaving five either dying or dead. The special apparatus includes a manometer, the mercury in which oscillates when the needle is in the pleural cavity and not in the lung or chest wall, cylinders to hold gas, and an aseptic fluid. While sterilized air was at first employed, the introduction of nitrogen would seem to be preferable. The good results obtained are due to immobilization and drainage of the diseased lung, there being no opportunity for auto-inoculation during the enforced rest given the lung during its period of compression. The X-rays will show whether pneumothorax has been produced, and whether or not it is being maintained long enough to prove beneficial to the diseased areas.

Some reports which we have seen cast discredit upon this mode of treatment by the statement of looked-for results rather than of what has really taken place. Notwithstanding the over-enthusiasm of such operators, this method of producing artificial pneumothorax has undoubtedly proved of substantial value in selected cases of tuberculosis when given in conjunction with other well-recognized modes of treatment for this widespread affection.

Creosote in the Treatment of Tuberculosis.—Treatment of tuberculosis by continuous inhalation of antiseptic vapors is described by D. B. Lees, of London (*Lancet,* November 9). He recommends and constantly employs for this purpose the following formula:

℞ Cresoti 3ii
Ac. carbol. 3ii
Tr. iodi 3i
Sp. artheris 3i
Sp. chlorof. 3ii
} = ℥i

Of 70 cases treated by this method he gives the following results:

Complete recoveries	48
Probably complete recoveries	3
	51
Incompletely cured	10
Final result not known	2
Died	7
	70

Of the 10 incompletely cured, 9 have improved remarkably and 1 has deteriorated. The method is not new but has been used more or less for 30 years.

The method of treatment is as follows:

The inhalation is by means of a Yeo's inhaler which must be worn continuously day and night except at meal times. A period of rest in bed is essential at the beginning of treatment. Digestive disturbances, anorexia, diarrhœa or constipation must be treated by suitable drugs. The patient must be supplied with a sufficiency of easily digestible food and for this purpose, malted milk in scalded milk with each meal, has proved invaluable. The teeth must be carefully cleaned after each meal and carious teeth should receive proper attention. Smoking must be absolutely forbidden.

In confirmation of these statements C. Ruata, of Perugia (*Lancet*, November 23), gives his experience, extending over 30 years and including 2,000 patients. He considers that when the tuberculosis is simply bacillary, this cure is certain; in the stage of septicæmia it is as certain when the lesions of the lungs are not so formidable as to render the treatment impossible many hopeless cases can be improved.

Kuhn's Mask in the Treatment of Tuberculosis.—The result of six years' experience with Kuhn's pulmonary suction mask, together with the theories as to its mode of action are considered by F. Grosse, of New York (*Post-Grad.*, September). The mask itself is a transparent celluloid case having separate chambers for mouth and nose, each chamber having an outlet for expiration and a valve for inspiration which can be adjusted to offer different degrees of resistance to the passage of air. At first it is applied for 15 to 30 minutes daily and the length of application is gradually increased as is the resistance to the passage of air.

The mask intensifies the phenomena of normal respiration: during inspiration the increased resistance stimulates the energy of inspiration and the lungs contain less air and more blood, in expiration the resistance to the air is greater and the blood is more rapidly forced out of the lungs, thus it alters and quickens intrathoracic circulation. The effect of this is in accord with certain well-known facts: tuberculosis is seldom or never observed in heart affections accompanied with pulmonary hyperæmia; the localization of tuberculosis is mainly in the apices where the circulation is slowest; the effect of Bier's hyperæmia shows that the most successful way to combat inflammation is to increase the circulation to the maximum. The mask promotes better circulation of blood and lymph, rest for the pulmonary tissue and improved bactericidal energy by increasing thoracic activity, and so is indicated in tuberculosis and other infections such as acute catarrhs and croupous pneumonia. It is found that spasmodic conditions, such as asthma, emphysema and irritating coughs, are relieved; exudates are most effectively absorbed; defective development of the thorax is corrected; general nutrition and metabolism are improved, resulting in increased appetite and digestion, reduced frequency of respiration and pulse, better complexion and gain in weight. The mask is contra-indicated in pleuritic adhesions, febrile

pleurisies and advanced stages of tuberculosis as well as in cases where the reserve power of the heart is small.

SYPHILIS

Syphilis.—A four days' discussion of syphilis at the Royal Society of Medicine (*Lancet,* July 13, p. 84) brought out most of the newer and many mooted questions in regard to the treatment of this most widespread disease—a disease which is ramifying through the populace in a manner little dreamed of except by those who have been performing the Wassermann test, and have had the opportunity of the following up a large series of cases by this method. Our statistics of this disease are practically valueless, owing to the concealment of the real cause of many of its forms, especially those of nervous type.

Salvarsan and Neosalvarsan.—It would be interesting to know the number of doses of these proprietary remedies which have been administered during the past year in order to determine whether salvarsan or neosalvarsan is the more popular among physicians. Certain it is that it has been by no means proved that neosalvarsan, other than the ease with which it can be administered, has any advantages over salvarsan, but it has been shown that certain grave forms of neuritis may occur from its use. Indeed, one of us has not used neosalvarsan at all, after having observed during the summer the patients under the care of Dr. Wechselmann in the wards of the Virchow Krankenhaus in Berlin and learning from him that he had discarded the use of neosalvarsan after using it in some 2,500 cases, and returned to the intravenous injection of salvarsan, preparing this remedy in the usual manner. His method of administering salvarsan is to start with a small dose—1/10 gramme,—using a special form of pressure apparatus,—and to increase the dose every four or five days until four to seven doses have been administered.

We recently saw one of our patients in whom the salvarsan had been administered according to the first method announced by Wechselmann, and there were still present two nodules, the size of pigeon eggs, at the site of the original injections in the back. It would be interesting to determine chemically if these areas still contain any arsenic, as the Wassermann reaction on the blood of the patient taken January 30, 1912, and the same day of the month in 1913 were negative, no medication having been used for the entire year.

Oppenheim (Congress at Frankfort, *Deutsche Zeitschrift für Nervenheilkunde,* Band xliii) in a study of 22 cases of cerebro-spinal syphilis, 44 cases of tabes, and 21 cases of general paralysis treated with salvarsan, does not consider that this drug proved of much value, while in 8 cases nervous complications followed its administration. Confirming this, Kienberger considers that salvarsan has no effect in general paralysis, and but little in tabes, but that the results in cerebro-spinal syphilis are good.

Trowbridge thinks that injections of salvarsan have a tendency to aggravate the symptoms and to hasten the ultimate result in general paralysis, though Collins and Armour observed marked improvement in 22 out of 28 cases of tabes treated with 6/10 Gm. of salvarsan.

Salvarsan has been used in chorea by Milian, who believes this disease to be syphilitic in its origin, and by Marie, who uses it because it is a convenient method of giving arsenic. Weill (*Bull. de la Soc. de Péd.,* October, p. 325) claims good results when the salvarsan is given in solution high up in the rectum.

Salvarsan in Frambœsia.—Assistant Surgeon, George F. Cottle, United States Navy (*U. S. Naval Bulletin,* January 12, 1913), after treating six cases of frambœsia with salvarsan finds that by this method he can bring about the disappearance of the lesions in a time which can be counted in hours, whereas, potassium iodide, only drug heretofore found to have any curative value, has never resulted in a cure in a less period than many weeks. So enthusiastic is he in regard to this mode of treatment that he believes that this prevalent disease in Samoa can be totally eradicated.

Noguchi's Butyric Acid Test.—Dr. M. C. Pease (*Post-Graduate,* October) finds this test to be of considerable importance, as it is a method by which inflammatory spinal fluids can be distinguished from normal fluids. It has an especial value in tuberculous meningitis where the spinal fluids often have the gross appearance of normal fluids and may even microscopically show very few abnormal elements; moreover it gives early information. In cerebrospinal syphilis and in anterior poliomyelitis it is frequently positive and is, therefore, of a confirmatory value in these conditions. A positive reaction is obtained with great uniformity in every variety of menin-

gitis and has no value in distinguishing between the different types. The fluid for the test must contain no blood, as even a few drops spoils the test, owing to the fact that this quantity is sufficient to give the globulin reaction although no meningitis is present. The reagents must be freshly prepared; they may change in two or three weeks. The test should be controlled by boiling the reagents without the special fluids.

The reagents used in making the test are as follows:

I. A 10 per cent. solution of butyric acid in 0.9 per cent. salt solution.

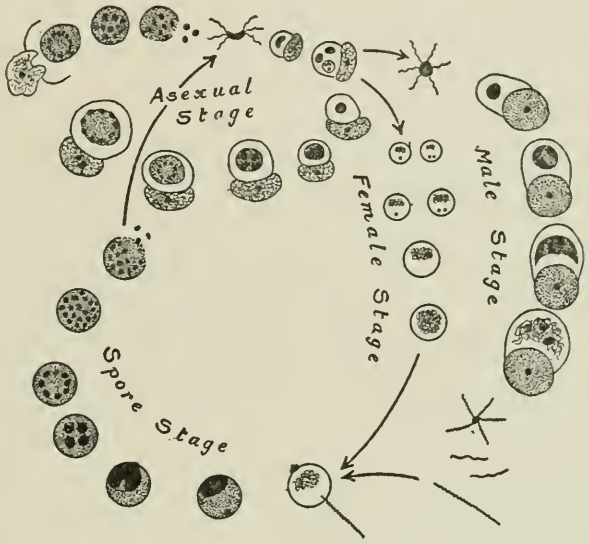
II. Normal sodium hydrate solution.

To 0.5 c.c. of the 10 per cent. solution of butyric acid in 0.9 per cent. salt solution add 0.1–0.2 c.c. of the suspected fluid and boil. Then add 0.1 c.c. of the normal sodium hydrate solution and boil again. A flaky precipitate is a positive reaction. No change in the solution or only a faint cloudiness is to be considered a negative reaction.

Luetin Test in Syphilis.—H. Noguchi (*Jour. A.M.A.,* October 5) states that the skin of animals inoculated repeatedly with *Spirochæta pallida,* as well as that of syphilitic individuals, does not behave similarly to the skin of non-syphilitic persons. The former react with an inflammation, while the latter do not, the intensity of the inflammation produced by the luetin, prepared from killed pure cultures of the spirochætes, varies from a nodule to a pustule, lasting for several days. The reaction sometimes does not occur until 3 or 4 weeks after the inoculation. It has been established that this luetin reaction is specific for syphilis, and that it is present in the majority of cases of tertiary, latent, and hereditary syphilis. Its presence in secondary untreated cases and in primary cases is less constant, although it is present in most instances of the former. A positive reaction was obtained in about 60 per cent. of the cases of paralysis and tabes dorsalis. In certain cases of tertiary and hereditary syphilis the inflammation at the site of the injection of the control fluid is sometimes as strong as that seen at the site of luetin inoculation. There is no marked influence on the skin, although a positive reaction could no longer be obtained in a case which had been treated and which was supposed to be cured.—*Archives of Diagnosis,* October.

Life History of the Spirochætes.—The complete life history of the organism of syphilis is described by J. E. R. McDonagh (*Lancet,* December 14). The sporozoite, when examined in vivo, can be stained very deeply without its motility being thereby impaired, it may then be seen in two forms, the circular and the kidney-shaped, its diameter is about 1½ microns, it is actively motile and at times flagellated. It can be found in the syphilitic lesions, in the general blood stream and in blood drawn from the healthy skin around the

Fig. 2.



chancre even when the *T. pallidum* cannot be found in the scrapings from the sore. This sporozoite enters a connective-tissue cell and there undergoes one of two series of changes: 1. It increases in size and by a process of budding gives rise to several bodies which become differentiated into male and female elements; these are freed by the rupture of the cell. 2. The sporozoite increases in size and divides into four by fission, the karyosome disappears; the four bodies form a ring, in the centre and around which appear other deeply-stained bodies, forming a spore-cyst. This is the true asexual stage, the sexual cycle is as follows: the male gamete is actively motile and flagellated, it enters a large mononuclear lymphocyte and increases in size, forming three pear-shaped bodies and eventually several coccal-shaped bodies, each composed of a clear ring with two deeply-staining

rods; these bodies are motile; the rods increase in length and become treponemata. The female gamete remains extracellular and increases to the size of a red cell; at the lower pole of the cell are motile dots, probably blepharoplasts, the chromatin increases until it fills the entire centre of the cell and it is then ready for fertilization. The females have been observed to undergo parthenogenesis. The whole life cycle can be followed out in a single section of a gland which drains the primary sore, if it is removed during the stage of general infection and stained with pyronin and methyl green. He assigns the organism to the class of sporozoa, subclass telosporidia, order coccididei, species leucocytozoon.

GONORRHŒA

A Specific Reaction for the Diagnosis of Gonorrhœal Arthritis.—Dr. Otto H. Leber, of New York City (*Archives of Diagnosis,* July), has done good service in reviewing the literature on the specific reaction for the diagnosing of gonorrhœa, which is especially valuable when the gonococci are present in joints, thus affording another method for the exact diagnosis of this specific disease. It would seem, too, that a polyvalent vaccine is of value in the treatment of this affection, where the serum is of no therapeutic interest.

CANCER

Prof. Czerny, of Heidelberg, stated at the Congress of German Naturalists and Physicians, held at Münster in Westphalia on September 16, that while he did not come to the Congress with empty hands as to the treatment of cancer by other than operative means, still he desired to confess at once that a specific cure for cancer has not yet been discovered and perhaps never would be found. Every year, he said, we hear of new discoverers who promise more or less infallible results, but close examination of their specifics show their worthlessness. He pointed out that the multiplicity of remedies makes it more difficult to find the proper treatment for cancer, and that this work of sorting the good from the worthless should especially devolve upon the numerous institutes, springing up in various civilized lands, whose express object is the study of this terrible scourge. Dr. Johannes Fibiger, Director of the Pathological

Institute at Copenhagen, has succeeded in producing cancer in rodents by feeding them with certain parasitic eggs found in the common cockroach.

Etiology.—Mr. Mansell Moulin stated before the Royal College of Surgeons that the remarkable capacity which some of the lower animals have for reproducing lost tissues and organs offered a suggestion as to the growth of tumors of all kinds in the human being. Man as an animal has long since lost the power which exists, for example, in the crab of reproducing new limbs. But if one carefully studies atavism and the numerous imperfectly developed organs in the body, which either play no part in the physiological processes or have acquired some entirely new property, we may find an explanation for the growth of tissues aggregated in the form of tumors.

Erwin F. Smith, of the Bureau of Plant Industry of the U. S. Department of Agriculture (*Science*), believes that the crown-gall of plants is in truth a cancer, as the growth is cellular and infiltrative, though metastases in the true sense of the word do not take place owing to there being no rapidly circulating stream. This disease is caused by the *Bacterium tumefaciens,* which gives rise to typical crown-galls when inoculated into the daisy. Jensen some years ago made similar statements in regard to growths which occurred on sugar beets.

The work of Rous in regard to hen sarcoma being due to a filterable parasite is also of great interest from a scientific standpoint.

Serodiagnosis of Cancer.—Work on the serodiagnosis of cancer is making progress. Kelling (*Arch. f. Verdauungs-Krankheiten,* June) reports on the hæmolytic test as applied to numerous patients during the past ten years. It will be recalled that in his method hen's blood is used, and his cases now number over 1,400, including over 400 affected with cancer. The reaction often disappears after the surgical removal of the cancer, but returns with recurrence.

Diagnosis.—From a report of the Commission on Cancer of the Medical Society of the State of Pennsylvania, it would seem that the average lapse of time before a person affected with cancer consults a physician is one year, and that a like period intervenes before he comes into the hands of the surgeon for operation. In such instances the precancerous stage has passed, and favorable results can hardly be expected. Dr. William L. Rodman, of Philadelphia (*Penna.*

Med. Jour., April, p. 531), has made some valuable observations on the early diagnosis of cancer, and gives some good advice to operate in its precancerous stage. Statistics show that of all the carcinomata in the human body more than 35 per cent. are in the stomach, 25 per cent. in the uterus, 25 per cent. in the breast, and 15 per cent. in other parts of the body. Prof. Rodman also points out that pain and retraction of the nipple in cancer of the breast are by no means invariable symptoms, since cancer often exists a year or more without the appearance of either of these signs.

Acute cancer, or Volkmann's carcinomatous mastitis, may be mistaken for suppuration of the breast, and there is great difficulty in differentiating abnormal involution, or what is called Schimmelbusch's disease, from cancer of the uterus. Abnormal involution may occur at any age, but in the vast preponderance of cases it is seen between 45 and 50 years of age, or at the menopause,—the age when cancer is most likely to appear. Dr. Rodman believes that in more than three-fourths of the cases it is impossible to differentiate between cancer and abnormal involution. Even although one cannot decide that a gastric ulcer has become malignant, it should be removed; gastro-enterostomy should be performed only when the disease is in inaccessible portions of the stomach. The greatest reliance must be placed upon frozen sections in the positive diagnosis of cancer.

Dr. Wilson of the Mayo clinic writes as follows: "No positive diagnosis has ever been given on a specimen which subsequently proved to be not carcinoma. So far as we have any history of the cases, no negative diagnosis has ever been given on a case which subsequently proved to be carcinoma. This rather unusual record is probably due to the fact that the surgeon almost invariably removed the entire tumor with a bit of the surrounding breast tissue before submitting it to the laboratory. When the tumor is very large, of course this can not be done, but in such cases it is usually possible to make the diagnosis clinically. Cases positively diagnosed as carcinoma clinically are not included in the three hundred. If the tissue contains the pathologic evidence of carcinoma, it can be determined quite as well by a fresh stain as in fixed specimens."

Treatment of Cancer.—Until recently, surgical interference seemed to promise the only relief or cure for a person affected with

cancer. But this is no longer true. The various methods of treating cancer other than by surgical means which have been especially advocated during the past year are as follows:

1. *Fetal Autolysates.*—The use of fetal autolysates is advocated by Prof. Fischera, of Rome. We are fortunate to have for the June issue a report from Prof. W. Wayne Babcock, of the Temple Medical School, on the use of this remedy in a large series of malignant growths. While temporary improvement has been noted, permanent results have not been secured.

2. *Autovaccines.*—In the treatment of cancer by autovaccines, Blumenthal and Lewin (*Zeitschrift für Krebsforschung.*, xi, p. 427) have secured favorable results in the sarcoma of rats after treatment with autolysates of their own tumors. The results were by no means so good when alien vaccines were employed. Blumenthal has seen a sarcoma the size of a duck's egg, representing one-fourth to one-third of the weight of the rat, which seemed to melt away after a single subcutaneous injection of the autolysate. The emulsion of the tumor is preserved in the incubator with toluol for three days to insure autolysis before it is employed. The treatment appears to be harmless, and more efficacious in sarcoma than in cancer.

Coca's original work was done with cancer, not with sarcoma. The general impression prevailing among physicians who have tried this method is that it should be used in combination with the X-rays, radium, or other recognized modes of treatment.

3. *Immunization against Cancer.*—Graff and Ranzi (*Mitt. a. d. Grenzgeb. d. Med. u. Chir.*, No. 2) report nine cases in which, after extensive experimental research, they removed the cancer, and injected subcutaneously an emulsion of the patient's own tumor. In three of the cases, after the lapse of three or four years, there is no sign of recurrence.

4. *Autohæmotherapy.*—Krokiewicz (*Wien. klin. Wchnschr.*, Aug. 22) takes 6 c.c. of blood from the median vein of the affected person, and immediately reinjects it into the subcutaneous tissue of the chest, allowing an interval of eight to ten days to elapse before repeating the injection. In advanced cases of cancer of the stomach, pain and vomiting were favorably influenced, and at times the general condition was markedly improved. The method appears to be especially valuable after the operative removal of the cancer.

5. *Choline Treatment.*—Professor Werner, working at Heidelberg with Professor Czerny, announced, on July 5th, as the result of his investigations, that it is the lecithin normally to be found in the body that is acted upon by the various forms of radiant energy used in the treatment of cancer, with the result that choline is produced in its tissues, and that it is this latter substance which gives rise to the retrograde changes in the cancerous cells which are so productive of good in the person affected.

Fifty-six patients have already been treated by a stable and non-irritating preparation of choline made by a Berlin chemist; but, as in the case of "606," this material will be first supplied to a few favored clinicians for further trial before it is sold to the profession at large. The preparation is said to act through the blood stream as well as when injected into the neighborhood of the tumor itself. In animals, large tumors disappear under its use. In man, sufficient time has not elapsed for conclusions other than the fact that the treatment has a most beneficial effect in retarding the growth of a cancerous mass and in causing its diminution in size.

6. *Colloidal Copper in Cancer.*—One of these new lines of research which is more or less worthy of record is the use of colloidal copper, a report of the use of which is published by Loeb, McClurg and Sweek, of St. Louis (*Interstate Med. Journ.,* December). They have studied the action of this agent in eight cases, in all of which the skin was involved either primarily or secondarily, and the changes could therefore be closely observed. The copper solution is introduced intravenously and its introduction is usually followed by a chill with rise in temperature and pulse rate, though these writers find that, on the whole, the patients tolerate the injections very well. The effects on the growth have been regressive changes and in some instances almost entire disappearance of the growth. The colloidal copper solution is prepared by Bredig's method, a description of which is given in the report. Their conclusions regarding the value of the procedure are:

> To summarize briefly, we may state that we are now able to cause the gradual retrogression of human cancer which until now has withstood various modes of treatment; and, furthermore, that the treatment does not seem to be limited to one kind of cancer, but applicable in the effective treatment of various kinds of cancer. Some cases which we have had under treatment for several weeks

seem to be near a cure, all others are progressing favorably. A definite judgment on the ultimate outcome must still be suspended at present. Patients, in which the growth of metastases is very rapid and extensive, and in which the cachexia is already very pronounced, cannot yet be benefited by this mode of treatment. We hope, however, that the further investigations which we are carrying on, at the present time, will lead to a still wider extension of the applicability of this mode of treatment. In particular, we have made preparations to test the effect of this treatment on other cases of sarcoma, and also in psoriasis.

There are two more conclusions to which we wish to refer very briefly. In the first place, our provisional opinion, which was the starting point of these experiments—that many cases of human cancer might be more accessible to this mode of treatment than are rapidly growing mouse cancers—has been confirmed by our observations. Secondly, our experiments present very strong additional evidence in favor of the view which one of us has always upheld—namely, that there exists no essential difference between cancer of rodents and human cancer.

7. *The Selenium-Eosin Treatment.*—Professors Wassermann and Kayser have experimented on the tails of mice with injections of selenium-eosin, and have shown that this product favorably influences mice affected with experimental cancer. For the present, however, the application of this remedy to man is attended with danger, as it is uncertain how far the remedy is toxic and how far therapeutic. Small tumors in mice disappeared within a period of ten days after the injection, and there had been no return after the lapse of several months. Large tumors were not so favorably affected.

8. *Radium, Mesothorium, and Other Forms of Radiant Energy.*—Those forms of radiant energy which have proved of service in the treatment of cancer will be discussed in special articles to be published in the Clinics during the present year.

9. *Sempervivum Tectorum in the Treatment of Cancer.*—Dr. B. F. P. McDonald, of Edinburgh (*Lancet,* January 11, 1913, p. 128), reports favorable results from subcutaneous injections of the sterile and concentrated juice of sempervivum or common houseleek in a case of mammary carcinoma that had been pronounced inoperable. After one month of treatment, the patient felt better, was relieved of pain, and there was reduction of the mammary enlargement. At the end of ten months diminution of the growth continued, the pain was relieved, there was improvement of the general health, and a gain of four pounds in weight. Dr. McDonald has given in this article the mode of preparation of the juice.

10. *Use of Potassium Salts.*—F. W. Forbes Ross, of London, and

Horace Packard, of Boston, believe that cancer is due to a want of balance of the potassium and other salts in the body, and that the disturbance of this balance leads to the disorderly and malignant growth of epithelial cells (epiblastic and hypoblastic) which is known as carcinoma. Demineralization of food by cooking is of great importance, and more potassium must be given to the body by the use of large quantities of the carbonate taken over long periods of time if the development of cancer is to be prevented in civilized man. But if cancer comes from plants, then food must be cooked. Kelling (*Archiv. f. Verdauungs-Krankheiten,* June) suggests that all the physicians in a given region would combine to order all of their patients over 40 to eat cooked food alone, it might give rise to a notable reduction of cancer.

11. *Coley's Fluid in the Treatment of Cancer.*—Dr. H. H. Greenwood (*Lancet,* September 28, p. 881) reported a patient, 67 years of age, suffering from a melanotic sarcoma, whom he treated with Coley's fluid, and after a year and a half of treatment, there had been no recurrence, and the patient's health was good.

Dr. Robert Knox (*Lancet,* September 14, p. 753) advises the use of X-rays previous to operations for malignant disease as well as afterwards.

Operation in Disease of the Testis.—Mr. H. Morriston Davies (*Lancet,* February 17, p. 418, also March 2, p. 607) considers that malignant disease of the testis should be radically treated by removing in one piece the testis, the chord, the arteries, and the veins of the vas up to their connection with the aorta, vena cava or renal vein, as well as the lymphatics draining the testis and the lymph-gland into which they drain. This is done by the extraperitoneal route.

RHEUMATISM

Immunity.—Those interested in the subject of immunity to this disease will find excellent material in the reports of the original investigations of Mr. Leonard S. Dudgeon (*Lancet,* June 15, p. 1593, June 22, p. 1671, June 29, p. 1737) and Sir Almroth Wright. The question has been mooted whether the lesions of "human clinical rheumatic infection may be reproduced, in all essential details, in

rabbits by inoculating them with the streptococcus isolated from patients suffering from rheumatic infection."

SCURVY

A. Holst and T. Frölich (*Zeit. f. Hyg. u. Infekt.,* lxxii, No. 1, p. 155) have succeeded in producing in guinea-pigs a condition showing all the characteristic pathologic changes which scurvy produces in man. This is done by feeding the animals exclusively on bread or certain cereals; when they are fed on fresh vegetables, carrots or cabbage, these manifestations do not appear, but if the vegetables are cooked they seem to lose some of their curative power, and a temperature above boiling, 110° to 120° C., apparently still further destroys this power. Now that this condition can be studied experimentally in animals, we may expect additions to our knowledge of the disease, and the solution of some of its problems.

HÆMOPHILIA

The use of human blood to check bleeding in hæmophilia is by no means a new procedure, but it has recently received much attention; either whole or defibrinated blood may be used, as they are apparently of equal efficiency; human and other sera are also of use. A. W. Lescohier, of Detroit (*N. Y. Med. Jour.,* February 3, p. 223), presents an interesting summary of his experiences with the use of serum, and concludes:

1. The coagulation period in hæmophilic subjects is greatly shortened by the injection of fresh serum.

2. The local application of fresh serum to wounds, in patients with delayed coagulation of the blood, tends to act as a hæmostatic.

3. The serum of any species is effective in producing this phenomenon.

4. The sera of the ox and dog should, however, be avoided because of the toxic symptoms frequently attending their use.

5. Although possessing some efficiency, antitoxic sera are less satisfactory than freshly drawn material.

By the use of his own blood, Sayer (*Jour. Amer. Med. Assoc.,* January 13) succeeded in stopping hæmophilic bleeding of two days' duration; he allowed the blood from his own finger to drop into the

wound. Welch (*Am. Jour. Obstet.,* April), after using human blood serum in 32 cases of hemorrhagic diseases of the new-born, concludes that it is a specific in such cases: he believes the bleeding in these cases to be due to a disturbance in the ferment content of the endothelial cells of the blood-vessels, and not to any abnormal state of the blood itself. The method has been used to control hemorrhage following operations on deeply jaundiced persons and, for this purpose, J. B. Deaver (*Amer. Jour. Med. Sci.,* June, p. 781) recommends injections of 50 to 200 c.c. before operation. The injection of blood is much simpler than transfusion, and there is no danger of thrombosis, embolism, or hæmolysis; it can be repeated frequently and used indefinitely. Meyer (*Archiv. Pediætrics,* xxix) reports the case of a child which had been passing blood in the stools and vomit for twenty-four hours; a cure was effected by injecting 3 c.c. of the mother's blood into the child's buttock, and repeating the injection five hours later. Nicholson (*Therap. Gazette,* xxxvi, p. 77) has treated cases of melena neonatorum in this way, and considers it a practical measure and very useful in combating emergencies. Barringer (*Jour. Amer. Med. Assoc.,* October 26) used the serum successfully in controlling hemorrhage of the kidney: the technic is described in his article, and the class of cases in which this treatment is indicated is detailed.

The sera of other animals as well as antitoxic sera have been used but, because of the danger of anaphylaxis if repeated injections are required, are not so generally favored. Rubin (*Münch. med. Woch.,* October 1) and others prefer the defibrinated blood to the whole blood; H. Schloessmann (*Beit. zur klin. Chir.,* lxxix, October, p. 477) uses an extract of parenchymatous hyperplastic thyroid tissue which is applied directly to the wound; he believes thrombokinase to be the active agent. L. W. Strong, of New York (*N. Y. Med. Jour.,* March 23, p. 591), describes the preparation of a powdered thrombokinase which he uses as a styptic.

Blood injections to hasten the healing of fractures in hæmophiliacs have proven valuable, and Dr. Otto Kiliani, of New York (*Ann. Surg.,* February, p. 314), describes a case still ununited after five months' treatment, which followed the normal course of healing after the injection of 10 c.c. of blood into the line of fracture.

DIABETES

Our present knowledge of glycosuria is well represented by Dr. Archibald E. Garrod's Lettsomian Lectures on Glycosuria (*Lancet,* February 24, p. 483, March 2, p. 557, March 9, pp. 629, 656) and Dr. C. von Noorden's series of lectures on the Pathology and Treatment of Diabetes, delivered at the New York Post-Graduate Medical School and Hospital, October 28th to October 31st. Dr. Garrod does not look upon diabetes as a sharply defined disease, but as the maximal phase of a series of manifestations rising by gradual steps from the normal of metabolism.

Etiology.—Prof. Thomas Barnes Futcher, of Baltimore (*Jour. Amer. Med. Assoc.,* December 21), has summarized in an admirable manner our present knowledge of the causes which lead to hyperglycæmia and glycosuria. He believes that Cohnheim's theory, which accounts for the hyperglycæmia as the result of a deficient consumption and oxidation of glucose in the tissues, has fewer adherents than formerly. While it may be shown that this theory is in part true, the present trend of opinion is in favor of Sulzer's view that the hyperglycæmia and glycosuria are dependent upon overproduction of sugar in the liver. It must now be accepted as definitely proved that not only the pancreas but also the chromaffin system, in which the adrenals play such an important part, the thyroid, the parathyroid, and the pituitary body exert a very important influence on carbohydrate metabolism. According to Sulzer one of the important functions of the adrenals is to "mobolize" or set free the carbohydrates in the liver, and possibly in other storehouses also. Under normal conditions, however, this influence is counteracted or exactly balanced by the hormone contained in the internal secretion of the pancreas, and we have a constant normal flow of sugar from the liver. When, however, the chromaffin system is for any reason overstimulated, as it may be through the sympathetic nervous system, there is an overproduction of the "accelerator" hormone of the adrenals; the "retarding" hormone of the internal secretion of the pancreas is more than counterbalanced, the glycogen in the liver is rapidly "mobilized" or set free, and a hyperglycæmia and glycosuria result. A similar result occurs in the cases of so-called pancreatic diabetes. Here the adrenal

hormone may be normal in amount, but, owing to the pancreatic disturbance, the pancreatic hormone is absent or diminished, and again the adrenal hormone is enabled to mobilize the glycogen of the liver.

TRYPANOSOMIASIS

Prof. F. C. Novy, of Ann Arbor, has succeeded in securing a singularly powerful immunity against *Trypanosoma lewisi* by preliminary inoculations of laboratory animals with attenuated cultures of the organisms. The same holds good with the *Trypanosoma brucei.*

It is more than probable that at one time trypanosomiasis was widely prevalent in our own United States and the possibility of danger from the disease being transmitted by animals is being more and more studied by investigators and clinicians.

SEVEN-DAYS FEVER

Cases of this disease have been reported by W. E. Deeks (*Jour. Amer. Med. Assoc.,* October 26) and Perry (*Pub. Health Rep.,* November 1) as occurring in the Panama Canal Zone. The cases were at first supposed to be malaria, but no plasmodia were found in the blood. Deeks describes the disease as being highly infectious, without characteristic prodromata, and having an incubation period of about ten days. The onset is abrupt, with a chill followed by a temperature of 101° to 104°; the fever lasts about six days with slight morning remissions and then falls rapidly; the pulse and respiration remain practically normal; there is no change in the blood picture. In all of the cases reported there was enlargement of the spleen and some nephritic irritation. The course of the disease was not affected by any method of treatment; all of the cases ran the usual course and recovered.

LEAD AND MERCURIAL POISONING

Avenues of Absorption.—Dr. T. M. Legge and Mr. K. W. Goadby (*Lancet,* January 18, 1913, p. 183) in their book on Lead Poisoning and Lead Absorption, express the belief that the main avenue of entrance of lead into the body is the lungs rather than the alimentary tract. In certain factories the dust has been found to contain as much as 10 per cent. of lead. It is evident, from the readiness

with which lead may thus be introduced into the system, what disastrous results must follow in one who is at all predisposed to this poisoning. Attention may here be called to the ease with which mercury may be introduced into the system during the treatment of syphilis by inhalation, a method of using the drug which is not employed to the extent that its merits would seem to warrant.

Diagnosis.—Stitt (*Nav. Med. Bull.,* April) has confidence in the reliability of punctate basophilia in the diagnosis of plumbism. He refers to Schmidt's opinion that when basophilic granules are present in 100 per million of the red cells, the finding is pathognomonic of lead poisoning, also to Oliver's belief that the diagnostic value of the sign is uncertain since he found it negative in 40 per cent. of his cases. All of the cases here reported showed basophilic stippling, and Stitt insists on the great value of the sign in the diagnosis of lead poisoning: he considers that malarial stippling can be differentiated from plumbic stippling, the former showing rather small bluish dots which tend to be circular while those of the latter condition are larger and more irregular or splotchy in shape.

In the cases he reports lead was introduced by inspired air, and all developed encephalopathy. This raises the important question, whether lead poisoning through the respiratory tract by means of inhaled lead dust is more likely to produce encephalopathy than that by the more common method of absorption, in which the symptoms produced are usually those of neuritis or intestinal colic.

INFANTILE PARALYSIS

Treatment.—During 1912, and in the present issue, much attention has been paid to the subject of poliomyelitis, now widespread throughout the English speaking world. We were fortunate in being able to present two papers by Dr. Flexner, the master of this subject, and the one in the present issue contains some practical suggestions for the treatment of the affection. The question now awaiting solution is as to the source from whence the infection comes. It would seem that animals must bear their full share of the blame. For example, Dr. H. K. Marks has shown that when the virus of poliomyelitis is injected into rabbits they soon die with symptoms which bear no clinical resemblance to poliomyelitis, but that the typical form

of this disease may be produced by the injection into the monkey of the virus found in the rabbit. No cultural experiments of the filterable virus have been successful.

Kernig's Sign.—Dr. E. Farquhar Buzzard (*Lancet,* April 6, p. 922) has attacked the value of Kernig's sign in this condition. Dr. W. H. Terthowan believes that the naso-pharynx is the seat of exit of the virus rather than of its entrance, and that the gastro-intestinal tract is the seat of entrance. The virus is highly resistant.

While the injuries in this affection concern chiefly the central nervous system, the lymphatic system, also the parenchyma of certain organs, as the liver, are likewise affected. The lesion consists in the "hyperplasia of cells in the lymph-nodes and lymph-sinuses, and of corresponding parts of the spleen and of the hæmolymph glands."

Vaccines in Infantile Paralysis.—A prophylactic vaccine against epidemic cerebrospinal meningitis has been developed by A. Sophian, of New York City, and J. Black, of Dallas, Texas (*Jour. Amer. Med. Assoc.,* August 17, p. 527), whose results are of great interest. Three injections were given and the blood of the subjects showed agglutinins and immune bodies. The agglutinins increased after repeated doses, and reached their greatest strength about a week after injection: the immune bodies could be demonstrated as early as the fourth day after the first injection, and the highest fixation occurred about three weeks after the beginning of inoculation; leucocytosis was present for a few days after vaccination. Three doses were given, the first 500 million, and two of one billion, and all the subjects responded by producing immune bodies; the local reaction was similar to that following antityphoid inoculation. Experience with the method has been too brief for the drawing of any conclusions as to its protective value or duration.

Transmission of Infantile Paralysis.—The common stable-fly, *Stomoxys calcitrans,* is said by Rosenau in experiments carried on in Harvard University at the suggestion of the Massachusetts Board of Health, to be the carrier of the dreaded disease anterior poliomyelitis. Infected monkeys were allowed to be bitten by the horse-fly, and then to bite other monkeys. In six cases out of twelve the experiment was successful.

MENINGITIS

Diagnosis of Meningitis by Hæmolytic Test.—Danielopolu (*Wiener klin. Wochenschrift,* October 3) has worked out a diagnostic test from the capacity possessed by the cerebrospinal fluid to inhibit in dog-blood the hæmolysis induced by sodium taurocholate. This capacity is remarkably increased in case of meningitis, as he found constantly in twenty-seven cases, with thirty-seven normal controls. The test is positive long before cytodiagnosis is possible.

PARESIS AND TABES

Etiology.—The bacillus paralyticans is believed by Robertson (*Lancet,* September 28) to be the cause of paresis and tabes; this organism, he says, is invariably present in the genito-urinary tract and the nasal mucosa of the paretic, and in the early stages of tabes a similar organism is always present, though it may later be replaced by one resembling the bacillus coli. In a considerable number of cases of paresis the organism can be obtained by culture from the cerebrospinal fluid and intraspinal injections of the living cultures into rabbits have produced lesions in the cord corresponding to the brain changes in general paralysis. Robertson classes the organism as a diphtheroid bacillus, but thinks it possible that this may represent only one stage in a protozoal life-cycle; it can be grown on hæmoglobin agar.

He calls attention to some peculiar findings in paretic brains,—certain very minute bodies which may be rod-shaped or irregular, and are grouped in the lymphatic spaces around the vessels and cells of the cortex: minute rods are also seen within the cytoplasm of the nerve cell, sometimes several in one cell; they have also been found in the cerebrospinal fluid; these bodies become visible only by the palladium methyl-violet method of staining; they are not seen in other than paretic brains, and their presence is explained on the theory that they represent other phases of the life-cycle of the B. paralyticans.

Working on this theory, Robertson has produced in sheep an antiserum which is given preferably by intraspinal injection, and has proven highly satisfactory in several cases of tabes, while in cases

of paresis it has apparently caused some retardation of the progress of the disease.

BRAIN TUMOR

Dr. J. Michell Clark (*British Medical Association,* Liverpool meeting: *Transactions of the Section of Neurology and Psychological Medicine*) reports a case of localized cupraxic centre in the left frontal lobe. The patient, aged 53 years, with all the signs of intracranial tumor, had never used his left arm, although it was not paralyzed. This made the defect a true motor apraxia. At the postmortem a tumor was discovered in the anterior part of the corpus callosum, extending into the left frontal lobe.

TRACHOMA

The prevalence of this disease in various parts of the United States is under investigation by the Public Health Service; the report of the results in parts of Kentucky has been published (*Pub. Health Rep.,* November 8) and shows that of 3974 persons examined 12½ per cent. were infected. It has been present among these mountain people beyond the recollection of the oldest inhabitants. The Indians of several reservations have also been found to be infected and it is expected that the disease will be found to be much more widely prevalent than has been supposed.

The inclusion bodies found in epithelial cells in cases of acute papillary trachoma have been a source of interest and speculation for years, they have been variously described as degeneration products of the cells; as an accompanying infection and as involution forms of the gonococcus, A. W. Williams (*Proc. N. Y. Path. Soc.,* vol. xii, No. 1) reports the findings of a group of workers in the New York Department of Health, that practically all cases of acute papillary trachoma give, in culture, an abundant growth of a minute, Gram negative, strictly hæmoglobinophilic bacillus which, with the Giemsa stain, has morphologic and staining characteristics like those of the trachoma inclusion bodies and this amounts, morphologically, to a culture of these bodies. One hundred and twenty-eight strains of this bacillus have been isolated and all of them show the same characteristics as the B. influenzæ; gonococci have not been found in any

of these cases though there is reason to suppose that this organism may form inclusions in blenorrhœa.

The hypothesis that one of the group of hæmoglobinophilic bacilli is the cause of trachoma is considered by Williams to explain several hitherto unexplainable phenomena of the disease such as its regular onset and insidious course; its variable contagiousness with its exacerbations of secretion, and the continued presence of trachoma in certain districts where helping causes are present. Growth of the bacillus was found to be favored markedly by the presence of organisms of the xerosis group and slightly by some of the streptococci, while staphylococci seemed to have a decidedly inhibitory action. The last fact suggests a possible method of treatment parallel to that which has proved so successful in the clearing up of diphtheria bacillus carriers.

ANEURISM

Matas's operations are of three kinds: "obliterative," in which the vessels opening into the aneurism are closed by suture from within; "reconstructive," in which the channel of the vessel is re-made; and "restorative," in which the mouth of the sac is closed.

Mr. H. Gilbert Barling (*Lancet,* May 25, p. 1399), at a meeting of the Surgical Section of the Royal Society of Medicine, collected 16 cases of one or the other of these operations which had been performed in England,—certainly a small number for the proportion of aneurisms that must exist in that country.

EMBOLISM

Mosny and Dumont removed an embolism from the femoral artery, and the patient survived the operation.

PNEUMONIA

Protective Substances in Human Serum.—The *Journal of Experimental Medicine,* November, contains five interesting articles on pneumonia, and those delving into the scientific aspect of the study of pneumonia will find valuable information on the toxic substances produced by the pneumococci, as, for instance, the fact that protective substances are certainly present in the blood of patients

recovering from pneumonia; that pneumococci may be recovered from the blood in approximately one-half per cent. of the cases; that the coagulation time of the blood is generally prolonged during the acute stage; and that the diminution in carbon dioxide is a constant factor in pneumonia. A. R. Dochez has shown that at the time of crisis in pneumonia the blood contains a proteolytic enzyme, especially in those cases which tend to recover, and that this enzyme is the product of pneumococcic activity.

Immunity in Pneumococcus Infections.—Carl C. Warden, of Los Angeles (*Jour. Amer. Med. Assoc.,* December 7), finds in his experiments (1) that pancreatin solutions alone are capable of producing immunity in infected and non-infected rabbits; (2) that filtered pancreatic extracts of pneumococci, and of pneumococci and staphylococci also, show immunizing and curative powers; (3) that all three of these agents are capable of modifying favorably the course of pneumococcic infections in man.

Serum Treatment of Pneumonia.—Freeman (*American Journal of Diseases of Children,* December 1), in the case of a child, injected simple pneumococcic serum in a manner similar to that used in the injection of salvarsan; the injections were made into the anterior abdominal wall, 100 c.c. being introduced with one penetration of the skin. A mixed serum composed of 50 c.c. each of the pneumococci and streptococci was also employed. While the general condition of the child seemed to improve, this was not indicated in the pulmonary tissues, which showed either no improvement or even an extension of the diseased area. The temperature was reduced along with a loss in the number of leucocytes. The duration of the disease was, however, shortened by three days. Of 15 patients who received injections, the mortality was 40 per cent. Of 15 controls, 8 recovered and 7 died; of 6 treated with pneumococcic serum, there were 4 recoveries and 2 deaths, while of the controls there were 5 recoveries and one death; of 9 patients injected with the pneumococcic and streptococcic serum, 5 recovered and 4 died, while of the controls there were 3 recoveries and 6 deaths. Repeated injections in patients who had shown no reaction from the first injection gave no better results,—certainly a very unfavorable showing for the serum.

Dr. Percy Kidd in the Lumleian Lectures (*Lancet,* June 15, p. 1589) raised the question as to whether the infection of pneumonia

came from dried sputum containing the pneumococcus or by auto-infection from the germs which, as pointed out by Dr. Sternberg, are continually present in the mouth and throat. Dr. Kidd considers that the crisis in pneumonia is caused by the increased presence of antibodies.

Prof. Ehrlich in an address on laboratory experiments and the chemical trial of drugs, before the German chemists at Freiburg, stated that Prof. Morgenroth had succeeded in finding in the quinine series substances which cure the fatal pneumococcic infection of mice.

STREPTOCOCCUS SORE THROAT

A widespread epidemic of streptococcic angina has been prevalent for over a year; in this country there have been a large number of cases in Baltimore, Chicago, New York and Boston, and in several cities the origin was directly traced to an infected milk supply. An excellent description of the course of the disease as observed in the Chicago epidemic is given by Davis and Rosenow (*Jour. Amer. Med. Assoc.,* March 16): the attack begins suddenly with or without a chill, the fever and prostration are out of all proportion to the local involvement, the pulse is slow and leucocytosis moderate; there is diffuse redness of the throat with increased secretion of mucus, the tonsillar crypts are filled with exudate and may be covered with a grayish membrane but rarely show ulceration. The acute symptoms may subside in a few days, but after the lapse of a week or ten days the patient may become suddenly worse and develop the symptoms of septicæmia with swelling of the cervical glands; blood cultures may show a streptococcus early in the disease, but are usually negative in the later stage when the glandular enlargement is marked; visceral complications occur most often in those cases which show little glandular enlargement but marked constitutional disturbances. Among the complications noted are suppurating lymph-nodes, empyæma, arthritis, erysipelas, pulmonary abscess, otitis media, brain abscess, meningitis, peritonitis and puerperal sepsis; Lanz (*Münch. med. Woch.,* August 20) reports three cases in which appendicitis was a complication and displayed a special tendency to gangrene.

Capps and Miller, of Chicago (*Jour. Amer. Med. Assoc.,* June 15, p. 1848), found that in a series of 173 cases, 85 per cent. used milk

obtained from one dealer, and of the households supplied by that dealer 51 per cent. had cases of the disease. Investigation showed that there was an epidemic of mastitis among the cows and that 29 cases of sore throat had occurred among the people on the farms; the milk was found to contain pus and streptococci which were virulent to guinea-pigs: this milk was pasteurized before distribution but the work was inaccurately performed, and the days when pasteurization was imperfect were closely followed by outbreaks of sore throat among the patrons of the dairy.

D. J. Davis, of Chicago (*Jour. Amer. Med. Assoc.,* June 15, p. 1852), describes the organism isolated from these cases as a Gram positive, encapsulated streptococcus appearing in pairs or short chains, and strongly hæmolytic; milk is always acidified and sometimes coagulated; it is differentiated from the pneumococcus by its failure to ferment inulin and its hæmolytic action. The capsule is acquired after passage through animals. In 43 cases occurring in Baltimore Hirshberg found an encapsulated Gram positive organism in pairs or short chains, which he called the pneumococcus.

A symposium on the treatment of this condition in the *New York Medical Journal* of August 31, brings out the following points: *Systemic treatment;* isolate the patient, keep in bed with plenty of fresh air and liquid diet, purge with calomel and give hexamethylenamine, Gr. v, every four hours as it seems to lessen the danger of complications, avoid the coal tar drugs and salicylates since they increase this danger; the use of antistreptococcus serum is also advised. *Locally,* avoid gargles and use applications of guaiacol, phenol 1 per cent. or hydrogen peroxide; spray with Dobell's or hot salt solution and keep cracked ice in the mouth. The patient should remain in bed for several days after all symptoms have disappeared.

GASTRIC ULCER

Mr. J. F. Dobson (*Lancet,* August 17) does not rely entirely upon gastro-enterostomy in the treatment of gastric ulcer, but in ulcers of the lesser curvature, or above the stomach, he also practises excision.

DUODENAL ULCER

The question of the diagnosis of duodenal ulcer from the symptoms alone is attracting unusual attention. Sir Berkeley Moynihan

still believes that many cases pronounced hyperchlorhydria by laboratory methods are really duodenal ulcer, but it must be remembered that in duodenal ulcer the amount of gastric acidity may even be subnormal. So close is the connection between ulcer of the stomach and duodenum and disease of the appendix that in nine out of ten cases he removes the appendix also, and in 80 per cent. of those removed appendicular disease has been revealed. Mr. D'Arcy Power has added five cases of perforated duodenum, four of these occurring within the space of six weeks and all recovering. It would thus seem that the prognosis is better in perforation of the duodenum than in perforation of the stomach.

HOOKWORM

A campaign against the hookworm is being vigorously planned through the Rockefeller Foundation of $100,000,000, with a national charter. An article is promised for the CLINICS during the present year, in which will be given an account of what is being done to eradicate this widespread disease.

APPENDICITIS

Recent advances in our knowledge of the pathology and surgery of the appendix are the result of careful study of cases which were unsuccessfully treated, and this is another instance of the value, so little recognized, of reporting cases which have not responded to our efforts, as well as those in which the results realize our hopes. At first the profession was almost united in the belief that the proper treatment for appendicitis was immediate appendectomy, and this was a fairly good working rule, considering the knowledge we then had of the disease. Later, chronic appendicitis was recognized, the interval operation became more frequent and led to a closer study of the conditions present; this study was further stimulated by reports of numerous cases which had not been relieved by appendectomy. These cases were not cured because, as we now know, many of them were not appendicitis or the appendicitis, if present, was merely incidental to the true condition, which it masked by reason of its more acute and localized symptoms.

Lane has taught us that kinks in the lower ileum, resulting from

ptosis of the cæcum or membranous colitis, may restrict the normal movements of the cæcum and colon, and give rise to symptoms very similar to those of chronic appendicitis, and that removal of these kinks permanently cures many cases not relieved by appendectomy. Wilms ascribes the symptoms in many cases to various anomalies of the cæcum; it may be of abnormal length, size, or mobility and, if so, he sutures it in place, reduces its size by pleating, or removes it altogether, thus relieving the condition. Gerster and Pilcher have described and depicted certain veil-like membranes and fibrous proliferations which may produce band-constriction and limit the expansibility and mobility of the intestine, thus interfering with normal fecal progress, and producing symptoms like those of chronic appendicitis; these conditions were not relieved by appendectomy but by removal of the constriction. Scheel (*Ugeskrift. f. Laeger,* lxxiii, 40) believes that in most cases of so-called chronic appendicitis there is also inflammation of the cæcum, and that cure ascribed to the operation may in many cases be merely the effect of rest in bed and regulated diet, or a coincident spontaneous remission, since inflammation of the cæcum is inconstant, and shows long intervals of latency.

While presenting these widely differing conclusions, the various writers have impressed upon us the same lesson,—that we must not consider chronic appendicitis as being only that and nothing more; but as co-existing with or secondary to a more widely diffused inflammation of adjacent parts of the intestine. The diagnosis can be made only after careful study of the condition, position, and efficiency of the intestine. Probably none of the other conditions mentioned will produce fever, leucocytosis, or rigidity, but appendicitis which does produce these symptoms may possibly depend on one of these conditions.

Some fallacies in our ideas of the conditions existing after subsidence of an appendiceal abscess are pointed out in an excellent article by Dodds-Parker (*Lancet,* February 10). The common belief that recovery from such an abscess protects against recurrent attacks is controverted by his statement that 39.9 per cent. of the cases he reports had recurrences, and in 70 per cent. of these recurrences suppuration was present. In this series were 18 interval operations, after all of which the appendix was found vulnerable to fresh attacks. He advises drainage only at the first operation and while suppuration

is active; for subsequent operations a rectus incision is recommended as this is less likely to cause adhesions. Fewer adhesions are found after an abscess than after several mild subacute attacks. He finds that the appendix is not destroyed or the lumen obliterated.

Mr. Kenelm H. Digny believes that the appendix, like the tonsils, has the function of protecting the body against chance infections by means of a continuous process of autovaccination.

Cæcum Mobile.—The writings of Sailer and other observers on the condition arising from an abnormal mobility of the cæcum and lower portion of the ascending colon is reviewed by G. B. Crow, U. S. N. (*Med. Notes and Queries,* May). The condition may be purely anatomical and cause no clinical symptoms, or, as a result of movement of the cæcum, kinks may be produced, causing partial or temporary obstruction, and ultimately giving rise to more or less atony and dilatation of the cæcum, with associated clinical symptoms. Sailer found that 20 per cent. of a series of 312 office patients had a distinctly palpable cæcum, and in 19 there was distinct tenderness over McBurney's point: in four cases out of five of suspected cæcum mobile examined by the X-rays a ptotic and greatly dilated cæcum was revealed; in three the appendix had been removed without relief. Tenderness over McBurney's point and constipation which does not yield to laxatives are the most important symptoms: there may also be mucus stools, distended or relaxed colon, gurgling on palpation, and attacks of pain relieved by change of posture. The condition may be mistaken for disease of the right tube or ovary, movable kidney, or intestinal adhesions.

HERNIA

Mr. Edmund Roughton recommends examination of the other side of a patient attacked with inguinal hernia, as in ten out of eighteen cases he found a vacant congenital sac present.

A plea for early surgical closure of all umbilical hernias is made by Kennedy (*J.A.M.A.,* December 21); the condition is common, and the operation complicated, especially after strangulation occurs; most of his patients were between 45 and 60 years of age. The onset of strangulation is often insidious, and the patient profoundly toxic before the diagnosis is made; if operation on the larger hernias is delayed until absolutely necessary only a small per cent. of the

patients can be saved. Brun (*Archiv. de Méd. des Enfants,* September) calls attention to the method followed by Nota of Turin in treating 244 cases of umbilical hernia in children from 2 months to 9 years of age, and declares it to be easy, harmless, and effectual, only one recurrence having been noted. An elastic cord is attached to a curved needle and passed under the skin and around the base of the hernia; the hernia is reduced, the cord drawn tight, and the ends secured; as the elastic cord cuts through the tissues they grow together behind it; the cord comes away in 12 to 15 days, and scar tissue fills the space. Strine (*Nav. Med. Bull.,* January) describes six cases of umbilical hernia, and comments on the frequency with which the condition is unrecognized as the possible cause of obscure abdominal symptoms. Some of his cases were cured by operation and others relieved by wearing a truss or pressure pad.

INTESTINAL ILEUS

The recent studies of Hartwell and Hoguet (*J.A.M.A.,* July 13) have thrown new light on the cause of death in this condition. In their experiments on dogs they were forced to exclude bacteræmia as the cause of death, and came to the conclusion that the fatality was due to the large quantity of water lost in the vomitus, since the water lost in this way may greatly exceed that in the urine. When this loss was made up by the subcutaneous injection of normal salt solution, the life of the animal was greatly prolonged, and the characteristic picture of starvation replaced that of ileus. McLean and Andries (*J.A.M.A.,* November 2) confirmed these findings as to the loss of water, and demonstrated the absence of any toxic substance in the blood or intestinal contents which could cause death or the symptoms of ileus. They, too, recommend the administration of salt solution to counteract the loss of water, and also advise enterostomy since this lowers the intra-abdominal pressure and lessens the resulting transudation of fluids through the intestinal mucosa. This work suggests that patients with intestinal obstruction can be greatly relieved by the simple means of administering salt solution hypodermically, and their condition so improved that they are fortified to withstand whatever operation may be found necessary.

Wollf (*Therapie der Gegenwart,* October) calls attention to the

comparative frequency with which ileus is found associated with pancreatic disease, and tells of one case in which ileus recurred several times in the course of a pancreatitis, the main factor probably being arterial thrombosis.

The demonstration of a hormone which stimulates the contraction of muscle fibres of the involuntary type has led to experiments with the object of producing a substance which could be reliably administered in conditions such as adynamic ileus or inertia uteri. Dittler and Mohr (*Zeitschr. f. klin. Med.,* lxxv, No. 3) experimented with such a product, known as hormonal, and failed to find any specific action on intestinal peristalsis, but noted in all cases a marked reduction of the blood-pressure, a reduction in the coagulability of the blood, stimulation of the salivary glands, and disturbances of the respiration and heart action: influence on peristalsis was manifest in only four of the 18 trials, and in these was evidently secondary to the drop in blood pressure and not a specific action. Their opinion, based on the results of these experiments, is that the preparation should not be used therapeutically. Voight (*Therap. Monat.,* October) used it in a case of intestinal sluggishness after operation, and observed severe but transient disturbance of the circulation with fever above 104°; an intractable diarrhœa followed and proved a serious complication. Schönstadt (*Berlin. klin. Woch.,* November 25) used the preparation in three cases of appendicitis with peritonitis and, while he observed no effect on the intestinal action, in one case collapse and death followed in twenty minutes, and in the other two cases, the same dose being given, not the slightest effect was noted. All of these observers are opposed to the use of the preparation because of the profound fall in the blood-pressure which frequently follows. Others have reported some almost miraculous results after its injection; but, in view of the serious complications that have been noted, its use cannot be justified except as a last resort, until means have been found to counteract its dangers.

Rupture of Intestines.—Compressed air forced into the rectum as a practical joke has in several instances been followed by traumatic rupture of the bowel. In such cases the best results seem to be obtained by turning the bowel and allowing the damaged gut to heal.

Intestinal Adhesions.—Diagnosis of abdominal conditions by the X-ray has been the subject of much careful work with the result, as

stated by Pfahler (*J.A.M.A.*, November 16), that adhesions can be demonstrated by this method if they have caused distortion, displacement, constriction or immobility of portions of the bowel; whether the condition is benign or malignant can usually be decided by a general survey of the patient's history and the clinical evidence in conjunction with the X-ray findings. He has in a few instances recognized "Lane's kink," also constrictions of the colon, gas locked in the sigmoid loop, and adhesions in various localities. This work points the way to the possible diagnosis and relief of many long-standing abdominal derangements.

CIRRHOSIS OF THE LIVER

Progressive Lenticular Degeneration.—This is a rare disease, described by Dr. S. A. K. Wilson, of London (*Lancet,* April 27, p. 1116), no case having been reported since 1890, with one doubtful exception, which was probably a case of congenital cerebral syphilis. Only six cases appear in medical literature and with the six cases of his own described by Dr. Wilson, we have but twelve cases on record; eight of these were familial. A remarkable feature of the disease is that it occurs only in young people, the average of the twelve recorded cases being 15 years. It usually lasts from four months to four years, although one of the cases is reported to have persisted for seven years. Cirrhosis of the liver is invariably found *post mortem,* although no liver troubles are manifest during the progress of the disease. Dr. Wilson defines the malady as "a disease which occurs only in young people, which is familial, but not congenital or hereditary; it is essentially and chiefly a disease of the extra-pyramidal motor system, and is characterized by involuntary movements, usually of the nature of a tremor, dysarthria, anarthria, dysphagia, muscular weakness, spasticity or hypertonicity, and contractures, with progressive emaciation; with these may be associated emotionalism and certain mental symptoms. It is progressive and, after a longer or shorter period, fatal. Pathologically it is characterized predominantly by bilateral degeneration of the lenticular nucleus, and in addition cirrhosis of the liver is invariably found, the latter morbid condition not giving rise to symptoms during the lifetime of the patient."

The tremor-like involuntary movements are an early and marked symptom, which is followed by muscular spasticity or hypertonicity. In advanced cases there is an extraordinary degree of immobility to the extent of utter helplessness, the face is fixed, expressionless or smiling stiffly. The disease is marked by emaciation and general muscular weakness, but there is no record of local muscular atrophy. The sensory symptoms are minor ones compared with the motor disturbances. Sometimes there are pains in the body and limbs. The reflexes are active, but not exaggerated. The cutaneous reflexes are normal, but toward the end the organic reflexes are impaired. In eight out of the twelve cases there was some mental impairment, and, although important, this is not considered an essential part of the clinical picture. Eleven out of the twelve cases showed no signs whatever of disease of the liver during the presence of the lenticular symptoms, but marked cirrhosis was discovered in all of them *post mortem.*

The optic discs and the pupillary reactions are normal, and there is no nystagmus. "The palate moves on phonation and reflexly; there are no cerebellar symptoms nor any impairment of sensibility, and the reflexes are not those of pyramidal disease."

Dr. Wilson considers progressive lenticular degeneration the "first definitely established morbid entity, whose most striking characteristic is a specific association between disease of one of the viscera and disease of a particular part of the gray matter of the central nervous system, viz., the lenticular nucleus." He considers the disease to be acquired rather than due to a congenital or abiotrophic defect. It is, without doubt, of toxic origin, but the nature of the toxin is speculative. It has a specific action on the lenticular nucleus and may possibly originate in the liver; there is, however, no evidence to suggest its being a syphilitic toxin.

Bibliography (only the original descriptions of the disease are here referred to).—1. Gowers: Diseases of the Nervous System, vol. ii, 1888, p. 656; Review of Neurology and Psychiatry, 1906, vol. iv, p. 249. 2. Ormerod; St. Bartholomew's Hospital Reports, 1890, vol. xxvi, p. 57. 3. Homén: *Neurologisches Centralblatt,* 1890, p. 514; *Archiv für Psychiatrite,* 1892, vol. xxiv, p. 191.

BILIARY CALCULI

The Bile Passages.—The old view that nearly all cases of gall-stones are symptomless is discredited by J. B. Deaver, of Philadelphia (*Amer. Jour. Med. Sci.,* June, p. 781), who claims that all produce symptoms, and most of them very evident ones, that should point to a positive diagnosis if properly interpreted. He calls attention to the fact that, with the exception of malignant disease, all the conditions which call for surgical interference upon any part of the biliary tract have their origin in infection: therefore we must rely, as in other cases of infective disorders, upon drainage, the great surgical principle of the treatment of infection. If we could get our patients in the early stage of the disease nothing would be met but infection, and cholecystostomy would suffice; but at this stage the disease is most difficult to diagnose, the physician is most reluctant to advise operation and the patient to undergo it.

Certain symptoms are significant of beginning disease of the bile passages, and these call for careful observation and treatment if not for operation. Of these he mentions the following: slight epigastric distress; occasional tenderness in the right hypochondrium, sometimes accompanied by slight rigor; a catch in this region during inspiration; excessive flatulence and belching; bilious attacks and, at intervals perhaps, a faint icteroid tinge to the skin without positive jaundice; a perceptible increase in the tension of the right rectus muscle as compared with its fellow; indigestion, so called, not definitely associated with the taking of food.

The time of election for operation is when medical treatment fails to control these symptoms, or when they recur after supposed cure. The most common result of infection is gall-stones; so long as these remain in the gall-bladder the conditions are still practically ideal for operation, but when they wander into the cystic, common, or hepatic ducts they give rise to complications.

He believes the gall-bladder should be drained whenever it is operated upon unless it is so far diseased as to be functionless: the common duct must be drained when it is opened for stone in any stage of cholangitis and particularly in cholecystectomy, in the presence of liver infection, and pancreatic involvement, even if there are no stones in the duct. Gerster (*Surg. Gyn. and Obstet.,* Novem-

ber) opens and drains every dilated common duct and palpates the duct after, not before, incising it. Brandt (*Deutsche Zeitsch. f. Chir.,* September) and Wilms in six cases substituted for the destroyed common bile-duct a rubber tube; this was successful in every case, but the tube must not project too far into the lumen of the intestine, and should be wrapped in omentum for its entire length. The tube was usually expelled by the twelfth day, by which time an adequate outlet for the bile had developed. L. L. McArthur, of Chicago (*N. Y. Med. Jour.,* January 27, p. 168), in cases where a temporary biliary fistula has been established, passes a small catheter into the duodenum, and through it gives water, medication, and food; to relieve nausea and anuria he gives a salt solution or water in this way, and finds it particularly valuable in cases of nephritis.

NEPHRITIS

Treatment by Thyroid Extract.—The use of thyroid extract in this disease is considered by J. F. Percy (*Jour. Amer. Med. Assoc.,* November 9) to be the first step in the direction of a cure since Bright described the disease in 1827. His conclusions are based on the results in thirty-five cases treated by this method, and there is no equivocation in his statement that " if the extract of thyroid gland as found in the shops is given in full doses to the average nephritic the urine will increase in quantity, the urinary solids will gradually return to normal, albumin and casts will disappear in from four to six weeks, the blood-pressure will be reduced, and the local and general symptoms, grouped under the terrible name of Bright's disease, will vanish." He gives 20 grains daily for a week, and then 30 grains a day. In patients under 60 with very high blood-pressure he adds 1/100 grain of nitroglycerin every 2 hours; in those over 60 with excessive pressure he also gives about 40 grains of potassium iodide daily. No change is made in the individual's ordinary diet. His results with the use of thyroid in the toxæmia of pregnancy were as gratifying as those in other forms of nephritis. In the average nephritic, from 20 to 30 grains of thyroid extract, given daily, for from four to six weeks, are required to cause a total clearing up of the urine. A much larger number of cases will need to be reported before this method can inspire general confidence.

Experiments made by Georgacopoulos (*Zeitschr. f. klin. Med.,* lxxvi, No. 4) lead him to believe that the use of parathyroids counteracts the intoxicating substances produced by nephritis, and that in cases of this disease the administration of an extract of the gland might be of value.

Salt-free Diet.—The treatment of certain forms of œdema and Bright's disease by the withdrawal of salt from the diet has caused physicians to limit the amount of saline infusions to the extent that they were employed some years ago.

Suicide by Drinking a Solution of Salt.—In the October 5 and October 26 issues of the *Jour. A.M.A.* there appeared some interesting data in regard to the committing of suicide by the drinking of a solution of salt. Dr. E. Heman Barlow, of Greenville, Mich., considers that this mode of committing suicide is common in China, a pint to a pint and a half of a strong solution being usually sufficient for this purpose.

FURUNCULOSIS

To abort furuncles, Kelly (*New Orleans Med. and Surg. Jour.,* December) dips a pointed match-stick in liquid phenol and bores it into the middle of the furuncle, producing an eschar; this kills the bacteria and relieves the pain. If the furuncle is farther advanced, remove the vesicle, and dress with 1 per cent. sodium citrate in normal salt solution and sterile gauze; this prevents coagulation, and keeps up the flow of serum; in addition to this he gives 15 gr. of sodium citrate after meals and a general tonic.

A simple and satisfactory method of relieving the annoying furuncles in the outer ear is suggested by Zografides (*Wien. klin. Woch.,* December 19). First disinfect the skin of the meatus and outer ear, then with a sterile probe find the most painful spot and make three to five incisions over it, using a sterile knife; cover with strips of sterile gauze moistened in 10 per cent. phenol, first applying cocaine, if necessary. He finds that the pain is quickly relieved and the furuncle aborted.

PARASITIC DISEASES

Pediculi Capitis.—A rapid method of exterminating the head-louse in the case of female children with long hair is given by Arthur Whitfield (*Lancet,* December 14, p. 1648), who has never seen

carboluria result from its use, though it would be better not to employ it in children under five years of age.

The patient is laid on her back on the bed with the head over the edge, and beneath the head is placed a basin on a chair so that the hair lies in the basin. A solution of 1 in 40 carbolic acid is then poured over the hair into the basin and sluiced backwards and forwards until the whole of the hair is thoroughly soaked with it. It is especially necessary that care should be taken to secure thorough saturation of the hair over the ears and at the nape of the neck, since these parts are not only the sites of predilection of the parasites but they are apt to escape the solution. The rule I give is that this sluicing shall be carried out for ten minutes by the clock. Lister showed that if the hair is soaked with carbolic acid solution for an appreciable time it takes up the phenol and the solution becomes progressively weaker. At the end of the ten minutes the hair is lifted from the basin and allowed to drain, but is not dried or even very thoroughly wrung out. The whole head is then swathed with a thick towel, or better a large piece of common house flannel, which is fastened up to form a sort of turban, and the head is allowed to remain like this for an hour. It can then be either washed or simply allowed to dry as the carbolic, being volatile, quickly disperses. At the end of this period every pediculus and, what is more important, every ovum is dead, and although the ova are left on the hair they will not hatch and no relapse will take place unless exposure to fresh contagion occurs. Incidentally any impetiginous scabs are softened so that they come away easily and allow any ointment which is used for the cure of this complication to be applied easily. In cases where there is no impetigo no further treatment is necessary. The hair itself is not damaged, but afterward appears particularly soft and silky.

Dermatomyositis.—F. E. Batten (*Royal Society of Medicine,* Neurological Section, February, p. 103), describes in detail dermatomyositis. A toxin of exogenous origin is believed by him to be the cause of the disease.

Hydrocephalus.—Anton and Payer (*Deutsche medizinische Wochenschrift,* February 8th, p. 254) recommend the puncture of the corpus callosum in cases of cerebral compression from internal hydrocephalus. "An anteroposterior incision is made 1 cm. to the

side of the sagittal suture, and 1½ cm. behind the coronal suture. The dura mater is then incised and a silver cannula introduced between the dura and the brain. The corpus callosum is then perforated and the cannula pushed into the ventricle. After the removal of 10 to 30 c.c. of fluid, according to the case, the cannula is withdrawn and the cutaneous wound stitched up." The headache and optic neuritis which accompany the condition will disappear after treatment.

SCORPION STINGS

The blood of the scorpion contains a substance which protects it against its own poison and, according to L. H. Mills (*Boston Med. and Surg. Jour.,* August 8) is of therapeutic value. In severe stings the point of entrance of the poison should be incised and bleeding induced; lumbar puncture is a valuable procedure, and may be performed more than once; 1 c.c. of scorpion blood per kilo of body weight may be given by hypodermic injection and repeated, with stimulation by the mouth, rectum, or hypodermically. In mild cases incise and apply evaporating lotions locally.

THERAPEUTICS

Poisoning by Scarlet Red.—Gurbski in 1910 reported a case in which the toxic effects of a scarlet red ointment were noted. A child, aged 11 years, was severely burned by an explosion of turpentine, which gave rise to burns of a severe degree, involving the lower two-thirds of the right thigh and the entire lower limb to the ankle. An ointment of 8 per cent. of scarlet red was employed, and fifteen hours after the application the patient complained of headache and dizziness. This was followed by violent vomiting and gastralgia, cyanosis of the lips, a low-tension pulse of 110, a temperature of 102.3° and an albuminuria. With the removal of the dressing and the placing of the patient on a milk diet the symptoms disappeared in a few hours. Eight days later the ointment was again employed and similar symptoms appeared, with the exception of the albuminuria. Five days later a third dressing produced similar symptoms, but the vomiting was less marked. Subsequently the ointment was applied to one-quarter of the wound at a time. No toxic symptoms developed and rapid epidermization followed. Gurb-

ski considered that this case had an especial susceptibility for this preparation, and that the poisoning was due to the amido group in the amido-azotoluol.

Henry H. M. Lyle (*Medical Record*) had a female patient of fifty years of age who was admitted to St. Luke's Hospital, February 21, 1912, suffering from extensive burns of the anterior chest, both forearms and wrists. The burns were caused by exploding benzine, and were treated by the dry method until the sloughs separated. A scarlet red ointment (8 per cent. scarlet red in U. S. P. boric acid ointment) was applied to a small portion of the granulated edges. As the wound reacted kindly the area of the application was extended. On the sixteenth day of the employment of the scarlet red ointment the patient complained of headache, dizziness and general faintness. The following morning she was seized with severe cramp-like pains in the epigastrium, was intensely nauseated and vomited violently. The pain was accompanied by tenderness in the upper right quadrant of the abdomen, the maximum point being in the region of the pylorus; the temperature rose to 102°; the pulse to 120; the blood count showed a slight leucocytosis; urination was frequent and painful, the urine showing albuminuria but no casts. Despite gastric sedatives and lavage, the nausea and vomiting persisted for ten hours. The violent onset, coupled with the pain and tenderness in the upper abdomen, suggested the possibility of a duodenal perforation. However, the low blood count, the lack of abdominal rigidity, and the peculiar intensity of the nausea pointed to some form of poisoning rather than to a perforation. After the discontinuance of the scarlet red and the employment of repeated stomach and colonic washes the symptoms gradually subsided. One week later the scarlet red was again applied to a small area, and gradually increased until two-thirds of the circumference was covered. The same toxic symptoms appeared, but of a milder degree, and again disappeared on the withdrawal of the scarlet red. After a second interval of rest the scarlet ointment was applied in a 4 per cent. strength; no further toxic symptoms developed. Throughout the treatment there were no signs of local wound irritation. Four months after admission to the hospital the patient was discharged cured.

In both these cases, it will be noted, the burns were extensive.

In the first case, that of a child, the ointment was applied to a fresh wound and the toxic symptoms developed within a few hours. In the second case the patient was fifty, the ointment was applied to a granulating surface, and the toxic symptoms did not develop until the sixteenth day. The marked features of both cases were the dizziness, the gastralgia and the intense nausea and vomiting. Schmieden, commenting on Gurbski's case, emphasized the fact that scarlet red should not be used in fresh wounds, and in large granulating wounds only a thin layer of the ointment should be painted on the edges.—*Med. Brief,* January, 1913.

Hormonal.—Injections of hormonal are by no means free from danger. W. Wolf (*Münch. med. Wchnschr.,* May 14), H. Birrenback (*Ibidem,* May 21), D. Frischberg (*Ibidem,* April 30), H. Boverman (*Ibidem,* July 9), Jurasz (*Deut. med. Wchnschr.,* No. 22), R. Mohr (*Berl. klin. Wchnschr.,* June 24), and many others have reported severe, and even fatal, results from the use of hormonal in the form of injections. Indeed, the latter writer goes so far as to state that a most alarming collapse, which may be fatal, may occur in any case in which hormonal is injected on account of the great lowering of the blood-pressure.

Autoserotherapy.—This method of treatment, which was described in detail in last year's article, has been the subject of experimentation in the treatment of other collections of fluid as well as in pleural effusions. Caforio (*Riforma Med.,* September 14) has used it in several cases of hydrocele and found it simple, harmless, and free from by-effects at the time or later. It was effectual in 45 per cent. of his cases, the outcome depending on the age of the hydrocele and the pathologic process responsible for it. In four bilateral cases he aspirated a few c.c. of the fluid from one side only and re-injected it, with the result that the fluid on both sides was absorbed. He also relates the experiences of others; thus, Jovane observed retrogression of both a peritoneal and a pleural effusion after reinjection of peritonitic fluid alone. In Carletti's case the peritonitic fluid alone was absorbed after reinjecting pleural fluid. In effusions which are manifestations of organic disease, a cure by this method is not to be expected.

Dry Air Cure.—From Prof. R. Kutner, of Berlin (*Prometheus,* Berlin, March 30; see also *Literary Digest,* June 1, p. 1156), we

learn of a new device for the treatment of wounds or diseased surfaces by the application of dry air in the form of a "spray." The apparatus consists of a bellows driven by an electric motor, a series of drying-bottles, and a tube fitted with changeable nozzles for conveying the purified air-current to the various affected parts of the body. Great care must be exercised to so regulate the current of air that it will not be too dry, as this would cause "mummification." It is evident that the device should be used only by an experienced physician.

Röntgenized Spleen Extract.—In the treatment of leukæmia it has been found dangerous to use the X-rays over the spleen in the treatment of this affection. Van Stockum (*Wiener klin. Wochenschrift,* November 21) experimented with the X-raying of the spleen tissue of the sheep implanted on the subcutaneous tissues of tuberculous patients with favorable results. He now uses, especially in surgical tuberculosis, extracts of spleen tissue previously exposed to the Röntgen rays.

New Cell Proliferants.—Bramwell (*Brit. Med. Jour.,* January 6) has cured many intractable ulcers, which refused to yield to other methods of treatment, by applying an extract from the symphytum officinale or comfrey. He uses lint saturated with the preparation and this, after a few hours, sets quite hard and acts as a strapping; the ulcer heals under this as under a scab, and after healing the dressing can be removed by the prolonged application of water. He has also used this extract internally to relieve the pain of gastric ulcer. C. J. Macalister (*Brit. Med. Jour.,* January 6), uses a 0.4 per cent. solution of the crystals of allantoin, a solid extract from the root of the comfrey, in the treatment of ulcers, and finds it of considerable practical utility, easy of application, and non-irritating.

Hypnotic Suggestion.—Mr. Prince Hopkins (*New York Sun*) has been making some interesting experiments among gangsters in an endeavor to cure alcoholism, excessive cigarette smoking, and other bad habits by hypnotic suggestion. During the course of the hypnosis he dwells on the burning sensation produced by alcohol, and claims that the subject thinks only of this or of the disagreeable pungency of the cigarette, and forgets the pleasurable sensations excited. Articles such as these too often drive patients to those who may take advantage of their confidence in more ways than one.

Treatment of Pruritus Ani.—Dwight H. Murray, of Syracuse (*Internal. Jour. Surg.,* August), believes that pruritus ani is often due to an infection of the anal skin by streptococci, especially in persistent cases. There need not be gross lesions, such as fistula, cryptitis, proctitis, ulcer, hemorrhoids, etc., present in chronic pruritus, though they may have been concerned with the primary infection. All these conditions may exist and yet no pruritus accompany them. The skin must be infected in order that the pruritus be set up. The streptococci, usually the streptococcus fecalis, may be demonstrated in the superficial layers of the skin, and the disease responding to vaccine therapy. A concentrated vaccine is made by transferring a colony from the Petri plate and allowing it to grow on slant agar for twenty-four hours. It is then washed off with an average 1 c.c. sterile salt solution, drained into a homeopathic phial through cheese cloth, and an equal volume of 1 per cent. carbolic acid solution added, and allowed to stand at room temperature twenty-four hours before using. Two to four minims of this autogenous vaccine are used for the first injection. If no reaction occurs within twenty-four hours the dose is doubled the next day. Improvement, with decrease of the number of streptococci in the skin, follows the first severe reaction, which consists of local redness and swelling together with malaise, headache and sometimes moderate fever. The reaction disappears in twenty-four hours. Phagocytosis increased for streptococci is noted. When the pruritus disappears the streptococci disappear also. Stock vaccines will not do at all because the streptococci in them are the pyogenes instead of the fecalis.

Treatment of Burns.—Liquor cresolis comp. U. S. P. is recommended by R. P. Stoops (*Therap. Gaz.,* October 15); he bathes the surface with a warm 1 per cent. solution until it is clean and the pain relieved, then covers it with strips of gauze or paraffin paper coated with an ointment composed of 1 per cent. of the liquor in vaseline. The burn should be redressed after 4 to 5 days.

Several modes of treatment were tried by Alexander (*Med. Press and Circular,* January 31) on a large number of burns of varying degree, and the results compared. Burns of the first degree responded best to picric acid solution on loose gauze, covered with oiled paper, and kept constantly moist. Burns of the second degree healed best with boric acid solution baths of two to six hours' dura-

tion and at intervals of two to six hours. Those of the third degree progressed most favorably when treated with ichthyol ointment (ichthyol 48 grains, olive oil 2 drachms, lanolin to make three ounces) on gauze, covered with oiled paper. All burns should be thoroughly cleansed with soap and water and all blebs opened as a preliminary to any method of treatment.

Vaccine Treatment of Colds.—The treatment of this most prevalent malady by vaccines is advised by G. H. Sherman, of Detroit (*N. Y. Med. Jour.,* March 2, p. 433). He writes that colds are usually a mixed infection by two or more of the organisms usually present, the pneumococcus, streptococcus, M. catarrhalis, Friedländer bacillus, or influenza bacillus. Repeated attacks occur since the infection is on the surface only, and the systemic reaction is insufficient to produce a general immunity. The advantages of this method of treatment are:

Convalescence is speedier, sometimes in 24 to 36 hours.

Stage of thick mucus secretion is aborted or shortened.

Expectorant drugs are dispensed with.

Risk of complications is much lessened.

Sherman uses stock vaccines; for cases having acute attacks which clear up in the intervals, usually due to the pneumococcus and streptococcus, he gives pneumococcus 40,000,000, streptococcus 30,000,000 and staphylococcus 150,000,000; for cases with a tendency to be prolonged and become chronic, infections with M. catarrhalis and S. mucosus, he gives pneumococcus 40,000,000, streptococcus 30,000,000 and M. catarrhalis 100,000,000.

Marked improvement is usually observed within 12 to 24 hours after the first inoculation, and this sometimes effects a cure. The dose should be repeated on the second day, and thereafter at three to six-day intervals until complete recovery takes place. He has also used the combined vaccines in many cases of hay fever, all of which were improved and some cured.

Electricity.—We are considering this year a series of papers on electricity, radium emanations, and vibratory massage, and all of the best work done under these subjects up to date will be discussed in these articles. At this time there is, therefore, no necessity to refer in detail to these most important branches of medical diagnosis and treatment.

Protection Against X-Rays.—Reicher and Lenz (*Deutsch. med. Woch.,* January 4) have found that when the skin is artificially made anemic by the use of adrenalin it is more resistant to both X-rays and radium than the normal skin, and will bear twice the amount of the soft rays for a considerable length of time.

Seeing with the Ear.—The optophone (*Literary Digest,* August 17, p. 255; also *Scientific American Supplement,* August 3) invented by Mr. Fournier d'Albe, of Birmingham University, England, is an instrument by which the blind are enabled to hear what they cannot see. It consists of a pair of telephones which are held to the ears and are also connected by flexible wires with the optophone box which is held in the right hand. This box contains the elements for producing an intermittent electric current. On turning on the current a ticking, rasping sound is heard; the instrument can be so adjusted that this sound is reduced to silence, which will last as long as a light shining into the box is of the same intensity. The slightest modification in the strength of the light will be perceptible in the telephone. The instrument can also be adjusted for darkness, and a light will then produce a sound the loudness of which indicates the intensity of the light. Moonlight is said to be "very audible, while the sun roars."

SURGERY

A DISTINCTIVE TITLE FOR SURGEONS

The Clinical Congress of Surgeons of North America has gone on record in favor of requiring that every physician in the United States and Canada shall be registered as a competent surgeon before he is allowed to perform surgical operations. Dr. Franklin H. Martin, of Chicago, the founder of the Congress, introduced a formal set of resolutions embodying this idea, and they were unanimously passed by the Congress. Dr. Martin in introducing the resolution said:

> I believe that this largest organization of surgeons on the American continent should assume the responsibility and the authority for standardizing surgery. This can begin at once by this body authorizing the appointment of a thoroughly representative committee, which committee shall have the power to act alone or in conjunction with other committees invited to join them, along the following lines:
>
> It should formulate a minimum standard of requirements which should be possessed by any authorized graduate in medicine who is allowed to perform independently operations in general surgery or any of its specialties.

The committee should consider the desirability of listing the names of those men who desire to practise surgery and who come under the authorized requirements.

The committee should seek a means of legalizing under national, colonial, State, or provincial law a distinct degree supplementing the medical degree, which shall be conferred upon physicians possessing the requirements recognized by this law as necessary to be possessed by operating surgeons.

It should seek co-operation with the medical schools of the continent which have the right to confer the degree of M.D. under the recognized standards and should authorize those colleges to confer the supplementary degree of surgeon on such of their graduates as have, in addition to their medical course, fulfilled the necessary apprenticeship in surgical hospitals, operative laboratories, and actual operatory surgery.

The committee should authorize and popularize the use of this title by men upon whom it is conferred, and its use should especially be urged in all directories of physicians in order that the laity as well as the medical man can distinguish between the men who have and the men who have not been authorized to practise surgery.

I believe that the time has come for a concerted action on the part of the great body of thinking surgeons on this continent to insist that the surgeon of the future shall not only be thoroughly educated in the science of medicine, but that he shall have a thorough training in the technic of surgery under the direction of a practical surgeon before he is legally or morally allowed to operate upon the public.

In Boswell's Life of Johnson is to be found the following letter from Johnson to his learned and worthy friend, Dr. Lawrence:

Feb. 7, 1775.

SIR:

One of the Scotch physicians is now prosecuting a corporation that in some publick instrument have stiled him *Doctor of Medicine* instead of *Physician.* Boswell desires, being advocate for the corporation, to know whether *Doctor of Medicine* is not a legitimate title, and whether it may be considered as a disadvantageous distinction. I am to write to-night; be pleased to tell me.

We do not know what Dr. Lawrence's reply was, but the same day Johnson wrote Boswell as follows:

I consulted this morning the President of the London College of Physicians, who says, that with us, *Doctor of Physics* (we do not say *Doctor of Medicine*) is the highest title that a practiser of physic can have; that *Doctor* implies not only *Physician,* but teacher of physic; that every *Doctor* is legally a *Physician;* but no man, not a *Doctor,* can *practise physic* but by *licence* particularly granted. The Doctorate is a licence of itself. It seems to us a very slender cause of prosecution.

ANÆSTHESIA

The Pulmotor.—The symposium upon anæsthetics reported in the June number of the CLINICS gives to this subject a most exhaustive

study. The pulmotor has undoubtedly been the means of saving a number of lives from gas asphyxiation during the year. It may also be used in those cases in which, after the administration of an anæsthetic, it is found necessary to keep up artificial respiration for a long-continued time.

Selection of an Anæsthetist.—In the choice of an anæsthetic it is often more important to know the anæsthetist than it is to know the anæsthetic about to be employed. An experienced man will often get better results with a dangerous anæsthetic than an inexperienced man will with even a safer anæsthetic.

Intratracheal Anæsthesia.—Dr. C. H. Peck, of New York City, (*Annals of Surgery,* July, p. 192), describes Elsberg's method of intratracheal anæsthesia from a study of 216 cases. He recommends it for all intrathoracic operations, and in extensive removal of the tongue and jaw; he finds the lung ventilation to be uniform, no fluid enters the air-passages, the after-effects and shock are minimized, and overdosage practically impossible, while respiratory strain is absent. "The patient being anæsthetized, a 24 F. catheter is introduced by direct vision with a Jackson laryngoscope, the patient's head hanging over the end of the table. The catheter is marked at 26 cm., and this point should be adjacent to the incisor teeth when the tip has descended to a point one to two inches above the bifurcation of the trachea. When the air is heard issuing from the tube, it is connected with the ether-air supply, and pressure is maintained at 18 to 25 mm. A motor drives the filtered air over the ether. Smaller catheters are used for children, for in no case must the diameter of the intubating tube exceed one-half that of the glottis. A pressure as high as 50 to 60 mm. is said to be within the range of safety. The lungs are deflated periodically by opening a valve. In a few cases the narcosis is insufficient, so a preliminary hypodermic injection of morphine (gr. ¼) and atropine (gr. 1/150) is advisable. In cases of laryngeal stenosis tracheotomy should first be performed, and the insufflation tube introduced through the opening."

Mr. Boyle's apparatus is described in the April number of the *Annals of Surgery.*

Pharyngeal Anæsthesia.—Crile's nasal tubes or similar contrivances are employed to introduce the anæsthetic vapor into the nasopharyngeal space, the anterior oral space being carefully closed by

plugging with gauze. This permits operations upon the mouth or neck to be performed without interference, the anæsthetic apparatus being out of the field of operation. Definite percentages of chloroform may be supplied by the Vernon-Harcourt chloroform inhaler. Souchon's method is to blow ether vapor by a hand-bulb from reservoirs into the pharyngeal cavity.

Intravenous Anæsthesia.—Dr. F. Rood (*British Med. Jour.*, September 14th) in describing intravenous anæsthetization asserts that ether infusion is safer than chloroform, since acidosis seldom follows its use. A continuous stream of warm ether in normal saline solution is injected directly into the vein; as high as 8 per cent. has been safely employed, 10.8 volumes of ether being soluble in 100 volumes of saline. As slight hæmoglobinuria may occur at 10 per cent. it is much safer to start with a lower percentage, 5 being usually chosen for this purpose, and the amount gradually increased. Continuous infusion would seem to be better than intermittent infusion, since, with the latter, clotting in the cannula is more liable to occur. Two hundred and ninety-seven cases are recorded, the patients coming under the anæsthetic in two-and-a-half to three minutes, usually without any excitement; vomiting occurred in only 5 per cent. Atropine, morphine, and scopolamine may be administered previously in order to prevent an initial sense of discomfort in the arm, the usual seat of the venesection.

Paraldehyde.—Mr. H. L. C. Noel (*Lancet,* November 2, p. 1220) uses paraldehyde in this way for minor operations.

N. Beresnegowski (*Archiv. für klin. Chirurgie,* vol. xcix, Part I) uses Ringer's solution instead of normal saline. There have also been some favorable reports upon the infusion of rectal ether and saline solution.

Hedonal Narcosis.—The dose of hedonal by intravenous infusion is 0.75 per cent. in normal saline. It should be remembered that the narcosis produced by this is profound and lasts for a considerable time after the operation is completed. Overdosage should be carefully guarded against, the tongue must be kept well forward, and the hedonal mixture must not be allowed to rise to a temperature of 120° F. The *British Medical Journal* of June 15 calls attention to certain fatalities which occurred when this method was employed.

Sir Berkeley G. A. Moynihan (*Lancet,* June 15, p. 1631) has described his special apparatus.

Intramuscular Etherization.—Ch. Walther, of Paris (*Bulletin Médical,* May 29), has a method of intramuscular etherization, in which 0.45 c.c. to 0.8 c.c. of ether was injected into the buttocks. Slight convulsions followed the injection and a whiff of chloride of ethyl or chloroform was then given. As the ether is thrown off by the lungs Dervauz raises the question, whether this method has any advantage over the usual mode of administering ether. Those interested in a fuller discussion of the case will find an interesting article by Professor Dumont, in the *Correspondenzblatt für Schweizer Aertzten,* No. 25.

Nitrous Oxide and Oxygen Anæsthesia.—The general consensus of opinion would appear to be that in major surgery nitrous oxide and oxygen anæsthesia has had a wide field open for its use during the past twelve months. This is especially true when re-breathing during part of deep inspiration, as advocated by Dr. Gatch, is practised, thus securing the requisite amount of carbonic acid in the blood to insure proper tension. The gas should be kept as nearly as possible at the body temperature, and several ingenious devices have been invented for this purpose, Teter's apparatus being especially valuable, although somewhat complicated. The apparatus of Dr. Gwathmey (*New York M. and S. Jour.,* November 9) is simpler, easily portable, and equally efficacious. It should be remembered, however, that complete statistics concerning these newer modes of administering the anæsthetic are not available, and the giving of several anæsthetics, one following the other, makes it all the more difficult to draw correct conclusions from the tabulated cases.

Spinal Analgesia.—Barker has collected 2354 cases of spinal analgesia, and attempts to draw conclusions from these tabulations. Three deaths occurred, but in these cases the patient was previously in a serious condition. Many failures are reported, 100, and a list of more or less after-effects is included. The ordinary practitioner, however, should hesitate before adopting this method of anæsthesia, and, before so doing, should endeavor to see it done by a master hand. The beautiful illustrations in Dr. Steel's article will help any one to understand the method.

Chloroform Collapse.—Heart massage in chloroform collapse

has been described by Dr. Israel Bram, of Philadelphia (*Jour. Amer. Med. Assoc.*, August 17, p. 540). The paper also contains the literature of the subject.

Phagocytosis from Ether Inhalation.—R. H. Ferguson, of East Orange, N. J. (*New York Med. Jour.*, May 11, p. 987), recommends the rectal injection of pure olive oil to restore phagocytosis lessened by the inhalation of ether.

Surgical Anæsthesia.—In summing up the lessons to be learned from a study of the influence of alcohol, chloroform and ether on the power of the body to resist disease the following points are emphasized by Ferguson (*N. Y. Med. Jour.*, May 4):

1. Do not give alcohol in the infectious diseases. It is particularly bad in pneumonia and septic conditions.

2. For surgical anæsthesia administer at any one time, during the anæsthesia, as little of the anæsthetic as possible.

3. Never use alcohol as a stimulant during or after an anæsthesia if the opsonic power of the blood is of any importance.

4. Make the anæsthesia as short as possible. Begin to administer the anæsthetic as late as circumstances permit and remove it just as soon as the operation will allow.

5. Use only a strictly pure ether or chloroform lest impurities in the anæsthetic augment the unavoidable depression.

6. Take special precautions for asepsis and antisepsis in all operations of any length. A very slight infection, which would not manifest itself under ordinary circumstances, may develop into a serious condition after an anæsthesia because of the impaired resistance.

7. Inject six ounces of olive oil high up into the rectum in all septic cases, and in all others in which the patient's power to resist infection may be called into play.

8. Remember that time is an important factor in restoring the opsonic index; therefore do not delay the administration of the oil.

9. In injecting the oil "make haste slowly." The sudden deposit of six ounces of oil may cause it to be ejected and all will have to be done over again. Give a slow, steady, continuous injection every time.

10. Use only pure, limpid olive oil. Absorption, to do the most good, must take place comparatively quickly. Therefore, take care to have at hand an olive oil free from stearins and other heavy oils, free fatty acids and other impurities.

11. If there is the slightest question whether to inject the oil or not, inject it. It can never do harm. Be on the safe side.

The Essential Oil of Orange in Anæsthesia.—The members of the Clinical Congress of Surgeons of North America had the opportunity, while in New York, of seeing administered at

the New York Post Graduate and Medical School the essential oil of orange along with the ether. This method introduced by Gwathmey uses only about half the quantity of ether otherwise employed and gives rise to no preliminary stage of excitement, and the after-effects of the anæsthetic are reduced to the minimum. One ounce of the oil of orange is placed in one of the three-bottle vapor anæsthetic apparatus and ether in the other two bottles. By this means it is difficult for the patient to discover when the administration of the ether is commenced (*N. Y. Med. Jr.,* September 14).

Prevention of Pain After Operations.—Dr. Forbes Ross, of London (*Lancet,* June 15; see also *Literary Digest,* July 20, p. 102), after general anæsthetizing of a patient for operation, advocates the use of a solution of quinine and urea hydrochloride as a local anæsthetic, in order to mitigate reactionary pain. He observes that it produces in the infiltrated parts none of the agony combined with the return of sensation in these parts that is occasioned by infiltration with cocaine and suprarenal extracts. He has found it most useful in compound fractures, crushed limbs, and in operations in any part of the body which can be reached by a hypodermic syringe.

The surgical automobile hospital described in *La Nature* (Paris, August 3) will prove a boon to those wounded on the battlefield by obviating the tortures of transportation. It is obvious that it will also prove useful in railroad accidents, fires, and other disasters in which immediate assistance to unfortunate sufferers is so desirable.

Pyelonephritis.—Dr. Cabot, of Boston (*Boston M. & S. J.,* October 24), gives an account of two cases in which the vena cava was torn during the removal of pyelonephritic kidneys. While both cases were successfully treated, the advantage of operating during two stages, namely, opening and draining, to be followed by removal, is well shown. It would seem that there is more danger of injuring the vena cava while operating on the right kidney than on the left.

Bone Surgery.—In describing some of the recent advances in plastic surgery of the bones Dr. John B. Roberts (*Jour. Amer. Med. Assoc.,* November 16) classifies these operations as strategic and reconstructive. The former includes those operations in which bone is displaced temporarily to gain access to organs behind a bony wall or an obstructing barrier—for example, an osteoplastic operation on the skull. Reconstructive operations are those done with

the object of repairing or rebuilding a bony region which has had its efficiency lessened or destroyed by injury or disease—for instance, the operative treatment of fractures.

Among the operations recently developed are McArthur's approach to the hypophysis by section of the frontal bone and the roof of the orbit; rebuilding of the nose by an osteoplastic flap from the forehead, by cartilage, or by bone grafts from the ribs, from the tibia, or from a finger; repair of disfiguring scars following necrosis of the frontal bone or a mastoid operation by inserting a properly shaped piece from the tibia; Esau's method of building up imperfectly developed or ankylosed mandibles by arthroplasty followed by the insertion of a piece of rib to supply the deficiency. Lexer, Vaughan and others have replaced diseased knee-joints with whole joints from an amputated limb. A diseased tibia or radius may be removed and a long graft from another bone inserted, resulting in the formation of a new bone. To secure rigidity of the spine after Pott's disease, Albee makes a groove in the vertebræ and inserts a long splinter from the tibia, while Hibbs gets the same result by fracturing the spinous processes and bending them down to bridge over the intervertebral spaces.

The operative treatment of fractures has already been thoroughly over the intervertebral spaces. Dr. Rugh's article in this issue of the Clinics affords interesting reading in this connection.

Decorative Surgery.—This word naturally suggests the "beauty doctor," and one may wonder why reputable surgeons (*Lancet,* January 6, p. 38; see also *Literary Digest,* February 17, p. 328) should enter this field. But when it is remembered that many facial operations are essential to health or, at least, for the comfort of the individual, it certainly seems perfectly legitimate for the regular practitioner to include them in his labors. Facial blemishes, without doubt, are often impediments in a person's career, while good looks are an asset which many are eager to gain or regain; therefore it is desirable that the removal, cure, or mitigation of a deformity or the correction of a blemish should be in the safe hands of the skilled surgeon rather than in those of an inefficient tyro.

Touching the Cardiac Apex.—Dr. W. W. Babcock stabbed the thoracic wall in the left fourth interspace, one inch from the sternum, and was able to introduce a finger and hook it around the car-

diac apex, which was rhythmically compressed against the superjacent ribs.

From an elaborate study of 72 consecutive cases operated on for more than two years for chronic ulcer of the stomach and duodenum by gastro-jejunostomy, Mr. James Sherren (*Lancet,* July 13, p. 76) concludes that operation in unselected cases of gastric and duodenal ulcer can be carried out with a death-rate of less than 3 per cent., and carries with it relief in certainly 96 per cent. of the cases, and the probability of cure in over 80 per cent.

Intraperitoneal Injections of Oxygen.—Mr. H. J. Godwin (*Lancet,* September 21, p. 828) introduces warmed oxygen into the peritoneal cavity after certain abdominal operations with the object of preventing the formation of adhesions. He considers that this also lessens shock and stops nausea. The amount of oxygen introduced should be sufficient to remove the dulness of the liver.

Removable Bladder Sutures.—Lieut. Colin Clarke (*Lancet,* February 17, p. 429) has used " tube " sutures in the bladder, connecting them ingeniously by the use of a closed tube, so that they may be removed on the tenth day.

Activation of Connective Tissue.—Dr. Alexis Carrel (*Journal of Experimental Medicine,* January, 1913) has succeeded in activating the growth of connective tissue outside of the animal body by the application of various tissue juices. It is hoped by this means that the time of the healing of wounds may be materially shortened. Exaggerated accounts of this new discovery of Dr. Carrel's have appeared in the newspapers, but he states that there is at the present time no practical application of his discovery to medicine, though he hopes at no distant date that it may be made available for the good of mankind. One of the greatest feats yet accomplished by Dr. Carrel is the evisceration of a cat and the keeping of the organs so removed alive for a variable period of time outside of the body.

Hospital Trains for Country Districts.—Two months' experience with a hospital train furnished by the Atlantic Coast Line has convinced Dr. C. W. Stiles, of the Public Health Service (*Pub. Health Reports,* January 31, 1913), of the feasibility of this method of relief for conditions existing in country districts, and he suggests the development of this line of work as a worthy object for those who are looking for an opportunity to place a welfare endowment. His

extensive experience of over twenty years in studying the sanitary conditions of the rural districts has impressed on him the fact that there are tens of thousands of men, women, and children in our open country who suffer preventable pain, who are inhibited in their physical, mental, economic, and moral development, and who in many cases either become physical wrecks or die because of the simple reason that they do not, and under existing local conditions they can not, have proper medical, and especially proper surgical, treatment. The greatest evil to-day in our rural States is undoubtedly the existing mediæval sanitation; district nursing is also a sad and crying need of our farm areas, about the beauties of which so much has been written. The average mother has at her disposal only the aid offered by her family or neighbors or a midwife who is usually ignorant and dirty. Numbers of children are handicapped in their physical and mental development by enlarged tonsils or adenoids that might be easily removed. The country practitioners can not do for the poorer people what the free city clinics are doing for the city poor, and have neither time nor opportunity to acquire the special knowledge and skill which is required. A travelling hospital would bring great relief to thousands of these people, and such a train of three to six cars could be fitted out without excessive cost. So far very little antagonism to the work has been experienced and a great deal of good has been accomplished, the worst feature being the wear and tear on the personnel of the hospital train.

OBSTETRICS AND GYNÆCOLOGY

The consensus of opinion at the meeting of the Gynæcological and Obstetrical Section of the British Medical Association was that a great many cases of inflammatory diseases of the uterine appendages require no surgical treatment, and that if this was adopted in acute cases such vaginal section rather than the abdominal route should be chosen and that in gonorrhœal cases the pus was relatively innocuous even when present in the peritoneal cavity. Thermal treatment was advocated by some, and vaccines had not done much good. If it is found necessary to remove all of the ovarian tissues, grafting in a routine manner is suggested. If both tubes are infected, according to Mr. Martin, hysterectomy is indicated, this being performed

in order to prevent further infection, though Mr. H. Beckwith Whitehouse (*Lancet,* August 3), after bacteriological examination of the uteri removed for these conditions, often found them to be sterile.

At the session of the International Congress of Obstetrics and Gynæcology, held in Berlin in September, it seemed to be the general conclusion that "all injuries of the peritoneum, whether chemical or mechanical, should be rigorously avoided, and that the most careful cleansing of the cavity with the removal of all tissues likely to necrose, and of all fluid, should be aimed at. On the whole, the dry treatment of the peritoneum was preferred to the moist. All raw surfaces should be carefully covered with peritoneum, and any intraperitoneal spaces, if infected or likely to become infected, should be carefully secluded. The indications for the use of drainage should be made more rigorous and placed upon a scientific basis. Of the utmost importance were the perfection of technic and the avoidance of any soiling of the surrounding peritoneum from the infected area."

Eclampsia.—Sir William J. Smyly (*Lancet,* August 17) in considering the treatment of eclampsia says that three therapeutic measures are indicated: first, the prevention of toxins; second, their neutralization or destruction when present; and third, their elimination from the system.

Accouchement forcé, especially by version of high forceps, is attended by a very high maternal and fetal mortality. Cæsarean section has given somewhat better results, but statistics have failed to prove the advantages claimed for it. The best results have been obtained by treating the symptoms and *assisting but not forcing* delivery. Professor I. Walker Hall (*Lancet,* August 17) considers that the cell balance is upset, while Dr. H. Leith Murray (*Lancet,* August 17) pointed out the curious resemblance between the effects produced by eclampsia and those due to a venomous poison. The majority of the speakers were opposed to active interference.

Attention is called by G. C. Fraser (*Indian Med. Gazette,* December) to the greatly increased incidence of this condition in the wet season and the few cases occurring during the dry weather: this increase is due, he thinks, to the decreased elimination by way of the sweat glands and the consequent accumulation of toxic substances

in the deep layers of the skin; these bodies enter the circulation and act as irritants to the kidneys and other organs. This suggests that the proper method of treatment is by placing the individual in a dry, hot atmosphere, such as a dry air ward, if possible.

Lugo-Viña (*Revista de Med. y Cir.,* January 25, 1913) recites the histories of two fatal cases in which the eating of oranges seemed to bring on the attacks of eclampsia. There previously existed some albuminuria but no definite symptoms of eclampsia.

The symptoms of toxæmia of pregnancy suggested to Shears (*Med. Rec.,* January 11, 1913) those of a lack of oxygen and he has treated several cases by free administration of the gas, with a resulting improvement and eventual recovery in all. He gives the oxygen either by inhalation or subcutaneously.

Epinephrin in the Uncontrollable Vomitus of Pregnancy.—In uncontrollable vomiting of pregnancy Sergent and Lian (*Presse Méd.*, December 11) suggest the use of epinephrin. They have employed it in six cases and in all of them its use was followed by rapid recovery, therefore they consider that the termination of pregnancy is not justifiable until this method has been first tried.

Puerperal Septicæmia.—Dr. G. T. Western (*Lancet,* February 10) concludes from a study of 56 cases of puerperal septicæmia treated with bacterial vaccines that (1) The mortality amongst those cases of puerperal septicæmia in which there is definite bacteriological evidence of bacteria in the blood stream is from 85 to 95 per cent. (2) This mortality may by inoculation with autogenous vaccines be reduced to about 55 per cent. (3) The mortality amongst notified cases of puerperal fever is about 60 per cent. (4) This mortality may by inoculation with appropriate vaccines be reduced to about 30 per cent. (5) In cases of puerperal sepsis, if a decision is made to explore the uterine cavity the opportunity of obtaining a culture at the same time should not be lost. (6) In the treatment of puerperal sepsis "stock" vaccines give inferior results, and should only be used when an autogenous vaccine cannot be obtained.

From a similar study of 39 cases Dr. R. J. Rowlette (*Lancet,* November 30) considers that vaccines do no harm, and that in the majority of cases they do much good, autogenous vaccines being much more trustworthy than stock vaccines, while the simultaneous administration of antistreptococcic serum gives additional efficacy to the

vaccine. In these cases it is, of course, of the utmost importance that a correct diagnosis be made of the organism causing the disease and there is great danger in the fact that this is not done; therefore, the one who uses an autogenous vaccine is much more likely to get the remedy indicated into the system than the one who depends upon an uncertain diagnosis and uses the stock vaccines.

BIRTH-RATE

Dr. Shirley F. Murphy (*Lancet,* August 10, pp. 361 and 392) believes that the decline in the birth-rate during the last century has taken place independently of the machinations of man, and suggests that the rates of birth and death are so intimately connected that they are probably interdependent; thus considering morbidity as an inherited characteristic; in other words, the greater the longevity of man, the lower is the death-rate. This law applies to certain animals, such as the elephant, which lives long and has a small progeny, and to rats which live but a short time and have numerous offspring.

DENTISTRY

Etiology of Dental Caries.—Mr. H. B. Waller believes that deficiency of thyroid secretion is perhaps the principal cause of dental caries.

Classification of Dental Irregularities.—Irregularities of the teeth have been classified by the British Society of Orthodontists (*The Dental Record,* p. 407) as follows: (1) Abnormal position of one or more teeth due to local causes; (2) abnormal formation of a part or of the whole of either arch due to developmental defects of bone; and (3) abnormal relationship between the upper and lower arches, or between either arch and the facial contour, and correlated abnormal formation of either arch due to developmental defects of bone.

OPHTHALMOLOGY

Cataract.—Lieutenant-Colonel Henry Smith (*Lancet,* February 10, p. 388) uses the intracapsular method of extracting the lens in cataract. This method is of especial value in hypermature cataract, a condition more frequently seen in India than elsewhere, and where the number of Lieutenant Colonel Smith's followers is very large.

Color-vision.—The experiments of a Departmental Committee of the Board of Trade of England made in 1910 show that the 1914 standard recommended is 6/6 in one eye and 6/12 in the other. With regard to color-vision they recommend "the retention of the wool test in a modified form," and, in addition, advise "examination by means of a special lantern" which has been devised under their supervision.

FIG. 3.

Glaucoma.—Iridectomy (*Lancet,* December 28, p. 1803) is now generally performed for the relief of tension in acute glaucoma, although the operation has not been productive of good results. In many cases of primary chronic glaucoma, cyclodialysis and various forms of sclerotomy and sclerectomy, with or without iridectomy, have also been resorted to, scleral trephining for glaucoma being of especial value.

Moving Pictures and the Eye.—Bahn (*New Orleans Med. and Surg. Jour.,* October) has noted the following conditions after watching moving pictures: Injection of the lid margins and conjunctivæ, lachrymation, retinal fatigue, pain in and around the ciliary region, headache, muscæ volitantes and dizziness. He finds that under the most favorable conditions they are to the normal eye a severe test of distant vision and endurance; under unfavorable conditions they

may in any eye produce symptoms of asthenopia and its sequelæ. But moving pictures have come to stay, Dr. Gould and others notwithstanding.

They are found to be of great value in scientific research and teaching. By their aid it is possible to analyze the epileptic fit, abnormal types of locomotion, and stomach and intestinal movements. They are valuable means of disseminating scientific knowledge among the people; as, for instance, in showing the habits of the house-fly and the way in which it transmits typhoid. It is observed that they hold the attention better and are more impressive than the words of a lecturer or a book.

Picture Test-Types for Those Who Cannot Read.—Some common object tests which have been arranged as nearly as possible to correspond with the letters of Snellen's types—6–6, 6–9, 6–12, etc., have been devised by H. Beales Collins (*Lancet*) for use in testing the eyes of small children who cannot read, for foreigners not acquainted with the Latin letters, and for weak-minded individuals. The lines and minor characteristics of the pictures are drawn of such a size as to be recognized as a whole by a person of normal visions, and a standard letter is given on each line as a comparison, these often being much smaller than the common object, but for normal sight they will appear just as clearly defined at the marked distance.

BACTERIOLOGY AND LABORATORY METHODS

Are Bacteria Necessary for the Existence of Life?—The theory that the microbe we must have always with us has been controverted by the experiments of Michel Cohendy of the Pasteur Institute, Paris. By an ingenious apparatus he succeeded in hatching and raising chickens for forty-five days, which by analysis were found to have no microbes in their bodies. Compared with controls, these "amicrobic" chickens seemed to be as healthy as the others. It would seem that the preparation of the animal organism for fighting disease-microbes is the result of heredity and not an individual acquisition, and that "life without microbes is possible for the higher animals without any bad effect on the organism."

Tests of Kidney Function.—A symposium on this important subject was published in the *Jour. of the Amer. Med. Assoc.* of January 18, 1913, the papers having been read at the annual meeting of the Association in June, 1912. B. A. Thomas, of Philadelphia, holds

that the two tests deserving greatest consideration are those made by employing indigo-carmin and phenolsulphonephthalein: he prefers the former as being simpler and most practical, since it obviates the difficulties of ureteral catheterization. After preparation of the patient for general anæsthesia, which in more than 2.5 per cent. of the cases is unnecessary, the cystoscope is inserted with the usual precautions as to antisepsis and local anæsthetization. Injection of 20 c.c. of a 0.4 per cent. solution of indigo-carmin is made intramuscularly into the gluteal region, and the elimination of the dye can soon be observed at the ureteral orifices; the elapsed time and the intensity of coloration are to be noted. In a functionally sufficient kidney the light blue should appear within fifteen minutes, or the dark blue within twenty minutes. Excretory activity may be influenced by the administration of ether or morphin.

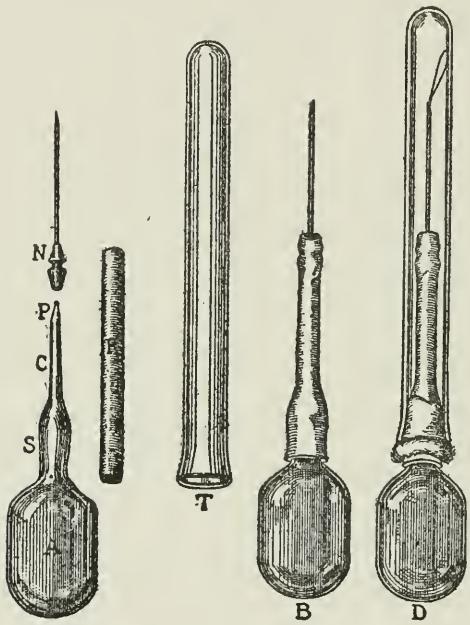
J. T. Geraghty, of Baltimore, favors the phenolsulphonephthalein test; in employing this, one c.c. of phthalein solution is injected intramuscularly. The urine should be voided at the end of one hour and ten minutes, and again after two hours and ten minutes. The amount of the drug excreted is estimated by the use of the Hellige colorimeter. When the test is used in connection with ureteral catheterization, the injection is made intravenously and the urine collected after two fifteen-minute intervals, beginning with the first appearance of the drug on either side. In thirty-five cases it was possible to verify the accuracy of the test at autopsy, and the lesions corresponded closely with the efficiency as shown by the test.

In the discussion of these papers general confidence in the accuracy of the tests was expressed, as well as appreciation of their great value, although individual opinion differed as to which test was preferable.

A New Bleeding Tube for Obtaining Blood for Diagnostic Purposes.—A simple method has long been desired for collecting blood in larger quantities than can conveniently be obtained from the pricking of the finger or the lobe of the ear. Dr. Albert Keidel, of Baltimore (*Jour. Amer. Med. Assoc.,* May 25), has admirably solved this problem by preparing a special apparatus (Fig. 4) which consists of four parts, a vacuum ampule (A) made of any desired capacity, with a neck (S) drawn out to capillary dimensions (C). After exhaustion of the contained air, the neck is sealed at P so that the enclosed portion becomes a partial vacuum. A short piece of white

rubber (R), which has been thoroughly sterilized by dry heat, is then fitted tightly over the neck of the ampule, and to the other end is attached a hypodermic needle, the lumen of which is kept open by a piece of wire. The whole is capped by a slender glass tube closed at one end. The entire apparatus may be sterilized by dry heat up to 150° C. When it is desired to use the apparatus, the cap should be removed, and the tube again sterilized. After making sure that

Fig. 4.



the point of the needle is in the lumen of the vein and has not pierced the opposite wall, a pair of hæmostatic forceps is used to break the glass tube at C. If everything goes well, the blood will be seen to flow at once into the ampule. When the desired amount has been obtained, or the blood no longer flows, the rubber is bent on itself and tied, and the ampule securely packed for transportation to the laboratory. Here the clear serum can be drawn off by breaking the stronger portion of the tube (S) just above the ampule, a file-marking having been previously placed at this point.

Intra-vitam Staining.—Dr. Edwin E. Goldmann (*Lancet,* May 4, p. 1183) has shown by his experiments that the cells of the placenta

are capable of extracting certain elements from the circulating blood as well as from stained tissues, and depositing them in the specific cell-elements of fetal origin. This would indicate that nucleate materials proceeding from the maternal organism, attracted by the placenta in large quantities, are temporarily incorporated in the fetal cells, there to be subjected to certain modifications before entering the fetal circulation.

Dr. Ira Carleton Chase (*Jour. Amer. Med. Assoc.,* August 3) finds the urobilinogen test for impaired liver function to be of great value. Any localized diseased cells will permit pathologic amounts of urobilinogen to pass to the urine. The galactose test on the contrary is a general functional test. Galactose is not passed in localized hepatic diseases when the remaining part of the liver has good compensatory function. In the various forms of cirrhosis the galactose test is uniformly positive, strongest in alcoholic cirrhosis. In septic conditions or advanced stages of infectious diseases, a positive galactose test results from liver degeneration. In cases of phosphorus poisoning, chloroform and mineral poisons, liver degeneration is not shown by the galactose test until some days after administration of the poison; in phosphorus poisoning, sometimes not until the second or third week. The great value of these tests to the clinician for differential diagnosis lies in the conclusions which can be drawn from their combined use.

Serodiagnosis of Pregnancy.—G. Fieux and P. Mauriac (*Jour. de méd. de Bordeaux,* March 24; *Ann. de gynéc. et d'obst.,* May) and E. Abderhalden (*Münch. med. Wchnschr.,* June 11) have done good work in the serum diagnosis of pregnancy by the use of the tests which have shown themselves of extreme delicacy. In using the antitrypsin test it must be remembered that in cases of cancer this index is also extremely hard, especially when the cancer affects the urine. Abderhalden uses dialysis and polarization. The delicacy of this can be shown by the fact that when placental material was injected subcutaneously or intravenously into a male, the reaction was positive. Unfortunately, this test does not indicate whether the fetus is living or dead, as the reaction is due to placental tissue. By this method it can be shown that there is a biologic independence of the maternal and fetal blood, as in cattle only about half of the

calves examined showed the same action on polarized light as was the case in the maternal serum.

Those interested in this fascinating and new subject will find Abderhalden's recent work on "Schutzfermente des tierischen Orangismus (Julius Springer) of value.

Wassermann Test.—Klausner (*Bio-chem. Zeitsch.,* November 20) has been experimenting with heated and unheated sera when diluted with water or extracted with ether. He finds that 50 per cent. of syphilitic cases and in certain skin diseases a precipitate to be obtained if the serum were diluted with three times its volume of water, this property is lost by heating or after extraction with ether. In the latter instance the serum may be reactivated by using an ethereal extract of brain lipoids.

A Precipitin Test for Meningitis.—Vincent adds one or two drops of an antimeningococcic serum to a tube of fresh centrifugated cerebrospinal fluid. If the case be one of meningococcic meningitis, after incubation at 52° C. for a few hours there will be a precipitate.

Test for Occult Blood.—A new point in the technic of the test for occult blood in the stools, is described by Boas (*Deutsche med. Woch.,* October 31) as follows: He removes the blood from the meat given the patient for several days before the test by pouring hydrogen peroxide over the finely chopped or scraped chicken or veal and stirring well; the meat turns white and is then rinsed in running water for several minutes to remove the peroxide. The meat may be made up into hash balls. When prepared in this manner, meat can be eaten without in any way interfering with the most delicate tests for occult blood, since all blood of foreign origin is excluded from the fæces.

Eosinophilia in Skin Diseases.—An interesting study of this subject by Schamberg and Strickler (*Jour. Cutan. Dis.,* February) brings out the following facts: Eosinophilia is usually present in dermatitis herpetiformis, bullous dermatitis, pemphigus and scabies; in scabies the increase is usually less than that in the bullous diseases. In some cases of bullous eruptions a high eosinophilia is observed about the time of a fresh outbreak, while, during quiescence, the number of eosinophiles may be normal.

Stereoscopic X-ray Pictures.—Dr. P. H. Eijkman, chairman of the Netherlands Röntgen Ray Society (*Die Welt der Tecknik,* tr. in

Scientific American Supplement; see also *Literary Digest,* May 11, p. 984), has made an interesting modification of the stereoscope in X-ray pictures. By means of bits of glass placed at an angle with the eye the object and the picture are visible at the same time. "The pictures are reflected from the surface of these glasses, while the object is at the same time seen through them, so that they appear to be in one and the same place, and whatever is revealed by the X-rays can be definitely located."

Bodily Transparency.—German and French biologists (Gradenwitz, *La Nature,* Paris, June 22; see also *Literary Digest,* July 27, p. 143) are saturating their anatomical preparations with volatile oils in order to render them transparent. This simple process has been developed by Professor Spalteholz of Leipsic, by Yves Delage of Paris, and others, and the advantages of studies thus carried on can easily be imagined, for instead of the reproduction of the radiograph the actual specimen may be viewed from all sides. Professor Spalteholz finds that "there exists for each tissue, each organ, and each animal, an average index of refraction," and when a specimen is immersed in a liquid having this average index, and becomes saturated with it, the maximum of transparency is reached. Each part of the body thus treated which has an index differing from the average will appear more or less clearly, and the contrasts may be differentiated by coloring. Professor Spalteholz uses a preparation of the methylic ether of salicylic acid and benzoate of benzyl.

Chemical Food.—The triumph of the physiological chemist will be, not in giving us artificial foods the cost of producing which, we are told, would in comparison make the present cost of living seem like "free board," but in providing substitutes for an alimentary canal that fails to do its work, so that "a completely hydrolyzed and predigested mixture, consisting of the amino acids, sugar, and fat can be supplied. The glassware of the laboratory can take upon itself the functions of the walls of the stomach, and that tired organ may be completely relieved of its work."

Experiments carried out by Dr. Emil Abderhalden, of Halle, Germany (*Zeitschrift für Physiologische Chemie,* Bd. 80, p. 113; see also *Scientific American Supplement,* May 18, and *Literary Digest,* June 1, p. 1157), show that life was sustained and growth maintained in young dogs fed on a mixture of artificially made

glucose, glycerin, fatty acids, and amino acids, together with a little mineral matter. Presumably the same would hold good for young people could they be obtained for experimentation.

The Crystal Space-Lattice.—The atomic theory of crystal formation is to the effect that it is homogeneously built up, its structure being founded upon an exceedingly complicated and regular point system, the points of which represent the chemical elementary atoms. Mr. A. E. H. Tutton (*Nature,* see *Lancet,* January 18, 1913, p. 185) has studied crystals by means of the X-rays, and has thus been able to obtain the space-lattices of the crystal structure themselves.

Absolute Zero.—The hypothetically absolute zero temperature of the text-books is almost realized in the reports from a physical laboratory in Holland (G. Bresch, *La Nature,* May 18; see also *Literary Digest,* June 22, p. 1295), where a temperature only one degree above 273 Centigrade was obtained. The results achieved by Professor Kamerlingh Onnes in his laboratory for the continuous production of low temperatures have shaken many of the props of the old physicists. All sorts of phenomena are there studied at temperatures as low as 270° below zero Centigrade. D'Arsenval, in an address before the International Cold-Congress in Paris, October 12, 1908, predicted as a result of these studies the elucidation of " the intimate constitution of matter and the nature of electricity."

The Reaction of Urine to Litmus Paper.—In a recent number of the *Journal of the American Pharmaceutical Association* Mr. G. H. Meeker discusses certain improvements in manipulation in determining the reaction of urine to litmus paper. Although the test appears to be a simple one, fallacies arise from the use of dry litmus paper and from the faintness of the change of tint. The eye needs a control color guide in order to render the results certain. The plan suggested is as follows: Half fill a small beaker with the urine and take two slips of red litmus paper, R1 and R2. Wet one slip, R1, with neutral water and lay upon a white tile. Hang the other slip, R2, over the edge of the beaker, so that it is immersed about two-thirds of its length in the urine. After three minutes lay R2 beside R1. Proceed in the same way with two slips of blue litmus paper, B1 and B2. The order on the tile should be R1, R2, B2, B1. In this way the eye can readily detect any change of color that may have occurred. There are three possible alterations in tint: (1) R2 may become bluish, indicating alkalinity in the urine; (2) B2 may

become reddish, indicating acidity; (3) R2 may become bluish and B2 reddish, indicating that the urine is amphoteric. If an alkaline reaction is observed it is important to determine whether or not it is due to ammonium carbonate. This is done by heating the tile gently until the paper slips are perfectly dry. If R2, after having become bluish, regains its reddish tint the presence of ammonium carbonate is indicated. In such case the bladder is probably infected. The color changes indicate whether the urine is faintly or strongly acid or alkaline. It is an advisable precaution to wash the hands carefully before handling the test papers.

Blood-Crystals.—Dr. Reichert, of the University of Pennsylvania, together with his colleague, Dr. Amos Peaslee Brown, have made important discoveries in regard to blood-crystals that will prove along with the biological blood-test of practical value in the identification of criminals. They find that these crystals differ in the various animals and in the different races of men, as, for instance, in the white man and the negro. The difference consists partly in form and more particularly in the molecular structure, which can be studied only by the polarizing microscope.

The Synthetic Production of Rubber.—The synthetic production of rubber is of interest to every physician, whether the owner of an automobile, a sphygmograph, or any one of the various other articles in which rubber forms a constituent part. Isoprene, C_5H_8, acted on by metallic sodium, is the starting point for the artificial preparation of rubber, this substance being obtained from fusel oil set free in fermenting sugar made from starch.

A New Allotrophic Form of Hydrogen.—The announcement of Sir J. J. Thomson that he has discovered a new gas (H_3) that holds the same relation to hydrogen that ozone (O_3) does to oxygen is important as possibly introducing a new therapeutic agent. The amount yet obtained is infinitesimal, but sufficient has been isolated to determine its molecular formula at 3.

Sacculose from Sawdust.—A dextrose combined with a large amount of fermentable substances has been prepared from sawdust by some British chemists. It may be employed as a fodder, or utilized in the manufacture of spirits, furfurol, and other by-products.

EMBRYOLOGY

Parasitic Castration.—Sir John Bland Sutton (*Lancet,* May 25, p. 1388) has discussed the curious condition known as parasitic castration, and shown how in the spider crab an invasion by certain barnacles leads first to degeneration and disintegration of its generative organs, and, after the parasite has left its host, to the conversion of the testis into a true hermaphroditic gland capable of producing both spermatozoa and ova which are powerfully attracted toward each other. He further believes that the make-up of certain parasitic fœtuses shows them to be similar in characteristics to the " embryonal rudiments " so common in ovarian dermoids.

Pygomelus.—At the present time there is on exhibition in Paris (*Revue Scientifique,* Paris, January 27; see also *Literary Digest,* March 23, p. 588) a Sicilian named Frank Lentini, who has a third leg which is the undeveloped portion of a twin; if this twin had grown to full size it would have been attached to him in the same manner in which the Rosa-Josepha sisters are united. The fact that this " third " leg is joined not to the man's own pelvis but to another bone of a second pelvis proves it to be a portion of an undeveloped twin. Duplicate internal parts have also been discovered. The leg is attached to his right side, and represents the *left,* and not the *right* leg of his rudimentary brother, being, as has been pointed out by Dr. Badouin, the natural result of the juxtaposition of the twins, which is the same as if two persons stood side by side, facing in the same direction. At the knee of the third (left) leg there is a rudimentary *right* foot. This is easily explained when it is remembered that the limbs develop from their extremities toward the centre, and not from the body toward the toes and feet. It is interesting to note in this connection that pyopagi are always females while pygomeli are usually males. This is attributed to the more quiet nature of the female fœtus, which favors complete development, while in the case of boys one twin dominates and practically destroys the other.

Bataillon has produced complete embryogenesis by puncturing the virgin eggs of frogs with fine metal stylets, the chromosomes in these instances being of a reduced type; complete forms have not been found.

HYGIENE

The Royal Commission on Sewage Disposal (*Lancet,* March 9, p. 697) recommends the establishment of a general standard of effluents,—one which does not contain more than 3 parts per 100,000 of suspended matter, and which, with its suspended matter, does not take up at 65° F. more than 2 parts per 100,000 of dissolved oxygen in five days.

Breast vs. Bottle Feeding.—Wm. H. Davis, the vital statistician of the Boston Board of Health (*Boston M. & S. J.,* February 15, p. 242), attempts to express in figures the facts underlying the common belief that the mortality among bottle-fed babies is very much higher than that among breast-fed babies and his statements are very significant. He shows that the death-rate during the hot months is only very slightly increased among the breast-fed babies while that of the bottle-fed rises tremendously: bottle-fed babies between the ages of one and three months show the highest mortality, and the bottle-fed infant over two weeks old is six times as likely to die as the breast-fed infant of the same age. Breast feeding would have saved nearly a thousand babies in Boston alone in 1911; the greatest reduction would have been in the deaths from diarrhœa and enteritis, 86 per cent. of which were among the bottle-fed.

The Common Drinking Cup.—The common drinking cup and the common towel are receiving the attention they deserve as possible carriers of disease; some States have passed laws prohibiting their use, and on board vessels or vehicles engaged in interstate traffic common towels are forbidden by the following order of the Secretary of the Treasury: "Common carriers shall not provide in cars, vehicles, vessels, or conveyances operated in interstate traffic, or in depots, waiting rooms or other places used by passengers travelling from one State or Territory or the District of Columbia, to another State or Territory or the District of Columbia, any towel for use by more than one person: *Provided,* That towels may be used again after having been sterilized with boiling water."

Water with Meals.—The warning against drinking water with meals has been impressed upon us all since childhood, the reasons given being that the digestive juices were so diluted as to retard diges-

tion, the flow of saliva lessened, and the food washed into the intestines before the process of gastric digestion was complete. The habit of washing down with water incompletely masticated food is, of course, harmful; but many persons habitually drink considerable quantities of water with their meals and yet show no impairment of digestion or nutrition. Several recent publications by Mattill and Hawk (*Jour. Am. Chem. Soc.*) indicate that fears as to the deleterious effect of water drinking with meals are not justified by the facts. They found an absence of ill effects, and concluded that "during water ingestion with meals there is better digestion and more complete utilization of the protein food, and that this effect is much less marked with a small water ingestion than with a large one. It is also more or less permanent, with the result that in an individual accustomed to taking considerable water with meals the effects of decreasing or increasing the volume ingested are not immediately obvious." They also observed decided improvement in the digestion of fat and lessening of fecal bacteria. In their opinion, these favorable effects are due to stimulation of the digestive secretions by the water, increased dilution which favors enzyme action and aids absorption, and conservation of energy by reason of the lessened amount of diluting secretion called for.

Sexual Hygiene.—Sexual hygiene is now being distributed to children *ad libitum, ad nauseam,* and their thoughts are too often turned towards sexual matters in a way that may be illustrated by two recent happenings. A mother desiring to explain these matters to her daughter told her of the sexual life of the flowers, and the deeply interested child replied, "Why, then plants are just like human beings in the way they have children." In one instance cited by a writer in the *Journal of the American Medical Association* copulation took place following such instruction.

Why Smoke is Injurious.[1]—A vague feeling often haunts those who live in smoky cities that the smoke is doing them harm, though some think that the soot deposited on clothing and other objects is the principal objection. There is little definite information about the injury that smoke really does to organic life, animal and vegetable; and we are told by Dr. Raymond C. Benner in *Metallurgical and Chemical Engineering* (New York, November) that it has

[1] *Literary Digest,* November 30.

been made the subject of few systematic scientific studies. The harmful ingredients of smoke are both solid and gaseous, and consist in general of sooty particles with tar and with their accompanying acids. Writes Dr. Benner:

> The amount of free acid in soot may be quite large. . . . Arsenic is also frequently present, but only in small percentages, usually less than 0.1 per cent.
>
> The nature and composition of soot make it the worst possible kind of dirt. It is black; in fact, it is the lampblack that forms the basis of black paints. Its power of absorption is great, giving it the property of occluding large quantities of injurious gases. The tar contained gives the soot the power of firmly adhering to anything with which it comes in contact, while the sulphur acids which it contains corrode most substances. It would be hard to imagine a more objectionable kind of dirt.
>
> A knowledge of the chemical compositions and other properties makes the injury which soot does to vegetation evident to one acquainted with plant structure and growth. Soot is detrimental to the healthy development of plants, inasmuch as it (1) blocks the stomata of the plants and stops, to a greater or lesser degree, the transpiration; (2) covers the leaf with an adherent black coating, which cuts down the amount of sunlight reaching the chlorophyl and, because of (3) the corrosive action of the tar, acids, etc. Evergreens, more especially the conifers, seem to be much more easily affected than other plants. On evergreen plants the leaves are exposed to the action of the soot for a much longer time than those which shed their leaves at least once a year. Therefore they become covered with a thicker coating of soot. The conifers also possess sunken stomata, which act as very effective pits to catch the soot.
>
> One might think that the excess carbon dioxide which is likely to accompany the soot would make plant growth more active, but it has been found that the increased percentage of dioxide is not great enough to be a factor. . . . In England, ash-trees have been observed to shed leaves four to six weeks earlier in the smoky districts than in districts free from smoke.
>
> Trees automatically keep record of their yearly growth by the width of the rings. A section of a Scotch fir, noted by Cohen, shows the date of the erection of a smoke-producing factory near the tree, by the decrease in the width of the rings. Vegetables, such as radishes and lettuce, planted in different parts of Leeds, have been found to be stunted in their growth nearly proportional to the soot-fall.
>
> The effect of smoke on buildings and building materials is marked, and it soon destroys the appearance of buildings which can not be cleaned. In smoky districts it is often necessary to modify a design in some respects because of the smoke. Sky-lights can not be used advantageously, as they soon become coated with the black soot. Drain-pipes must be arranged so as to avoid the splashing of water on the walls. Building materials (such as glazed tile), which admit of easy cleaning, are used much more in smoky cities than elsewhere. Granite and sandstone with a silicious binder form better building materials than limestone and sandstone with calcareous binder, which is easily corroded by acid in the

soot and rain. Thus the stones which are most easily worked are undesirable in smoky cities. The sulphuric acid acts on the calcium carbonate, forming calcium sulphate, which is more readily soluble than the carbonate, also causing it to swell and become porous and friable as well as more disintegrated. Dr. Smith has found mortar to contain as high as 48.16 per cent. of sulphate of lime, which was formed by the action of the sulphuric acid in the air, while limestone and marble have been found to contain from 0.52 to 3.85 per cent., due to the same cause.

The effect of the sulphuric acid in soot on most metals is greater than the action of a like amount of acid in rain-water or air. Soot containing acid adheres to the metals by means of its tar, and the carbon, together with the metal and acid, form an electrolytic couple, making corrosion much more rapid. This fact, Dr. Benner tells us, has been experimentally verified. Rails corrode six times as fast in a town as on a sandy coast, and nine times as fast in a damp, smoky tunnel. Moreover:

The question of exterior and interior decoration is one affected as much by the amount of smoke in the air as by the tastes of the owners of the buildings. Interior draperies and paper are soiled much quicker in a smoky city than elsewhere. If light paper is used in papering the rooms, it must be cleaned every six months and new paper put on at least once a year to keep it looking only half as well as it would in a smoke-free city.

The effect of soot on paint is, in most cases, a matter of appearance only. The time which it takes to spoil the paint depends, of course, on the amount of soot in the air, color of the paint, tar and acid in the soot. The number of paintings necessary in a given time depends on the above factors as well as upon the fastidiousness of the owner. In some cases the soot seems to act as a protective coating, while in others it has a corrosive action, destroying the surface-gloss and rendering the surface more easily weathered.

Soot in the air of cities has a marked effect on the weather in a number of ways. By (1) cutting off the light; (2) by increasing the duration of fogs; and (3) by making the minimum temperature higher.

As is well known, finely divided carbon in form of lampblack has the property of cutting off sunlight to a greater degree than most other substances. It is not surprising, then, to those of us who are acquainted with the soot clouds hanging over large cities, that the duration of sunshine has been found to be decreased 17 per cent., while if diffuse daylight is considered, the loss is even greater. Cohen finds, as an average of a large number of determinations made both in summer and winter, that fully 40 per cent. of the light is cut off by the smoke-cloud, and that the amount of light varies inversely as the amount of soot in the air. . . .

It may be said that each particle of moisture in a fog is formed or condenses around a solid nucleus or a dust particle. . . . For this reason fogs might be thought to be of more frequent occurrence in the city than in the

country. This is, however, not necessarily the case, and, as a matter of fact, dust particles are sufficiently numerous in the country as well as in the city, for the formation of fogs. Smoke does, however, increase the blackness of a fog, making it much denser than the country fog, simply on account of the black soot particles. The fog is also apt to be of longer duration because of the oily tar in the soot, which forms a film over the outside of the drop, thus protecting it from evaporation. It is said that at least 20 per cent. of the London fogs between September 1, 1902, and March 31, 1903, were artificially induced and preventable.

The amount of soot which falls on any area during a given amount of time forms a subject of interest to the public at large as well as to the scientist. Cohen finds the air in dull weather to contain 0.0119 grammes of solid matter, which he assumed to be soot, as it is always black, and these figures agree well with Russell's for dull weather. In Pittsburgh, I find that the amount of soot in the air corresponds remarkably well with the figures for the English cities. Numerous measurements of soot-fall have been made in as many different ways by collecting rain and snow and by catching the soot in various forms of vessels.

1902 one snowfall	30 tons Manchester	100 sq. miles
	820 tons Glasgow	per sq. mile
Snow	220 tons Leeds	per sq. mile
Rain	259 tons London	per sq. mile
Snow	600 tons Indianapolis	per sq. mile
Industrial centre of Leeds		539 tons per sq. mile
Suburban residence section of Leeds		26 tons per sq. mile
Centre of London		426 tons per sq. mile
Sutton, Surrey, just outside the metropolitan area		58 tons per sq. mile
Bo'ness, a small seaside village		72 tons per sq. mile

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